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GEORGE CLYMER.

Late Vice President of the Philadelphia Society
for Promoting Agriculture.

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MEMOIRS

OF THE

PHILADELPHIA SOCIETY

FOR PROMOTING AGRICULTURE,

CONTAINING

COMMUNICATIONS ON VARIOUS SUBJECTS

IN

HUSBANDRY AND RURAL AFFAIRS.

VOL. III.

"Let us cultivate the ground, that the poor, as well as the rich, may be "filled; and happiness and peace be established throughout our borders."

Tentanda Via est, qua nos quoque possimus tollere Humo :——

PHILADELPHIA:

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PREFACE.

IN presenting to agriculturists our THIRD VOLUME, we evince our desire to promote their interests, by promulgating all the information our correspondents have favoured us with, on the subjects we deem generally important. Some, of minor consideration, have been omitted. But we thankfully acknowledge, the public and patriotic motives of all. We should be highly gratified by the increase in number of our correspondents; because it would evidence an increase of a spirit of true patriotism, in thus diffusing a knowledge of the art, by which the great body of our citizens, in this agricultural country, not only gain a plentiful subsistence, but contribute to that of others; and mainly augment the public prosperity. The reception given to our former publications, justifies a hope, that the present will be favourably, and, we trust, profitably accepted. We conceive that it will not suffer by a comparison with our former volumes; as many subjects are brought forward well worthy attention.

If the circumstances of our country require an extension of domestic manufactures, and especially of those in which capitalists engage; the labours of the husbandman should be encouraged, as all-important to *them.*

Whilst our belligerent situation blocks up the channels of external commerce, and calls our citizens to the fields of warfare, thereby abstracting from agriculture, the labourers it demands; it is the more necessary to know how to use the number spared to us, with the greatest economy and advantage. In such case we must endeavour to raise the greatest product, from the more limited surface to which our ca-

pabilities, as to labour and means, reduce us. That this can be done, in no small degree, by superior attention and management, no doubt ought to be entertained. In the stages of advance to the state of prosperity, with which, heretofore, we have been blessed; constant proofs have been afforded, of the increase of products, by improvements in our style and systems of husbandry. Let any who recollect, (as some of us do,) the forlorn situation of our old settlements, before the *Plaster and Clover-Husbandry* was introduced, and became general, now view the fields transformed from barrenness to fertility; and contemplate the enviable state of comfort and wealth enjoyed by their present possessors. They are the owners of the soil they cultivate; which has grown fruitful and durably profitable, under the labours of their own hands. The "*sic vos non vobis*" of other countries, is inapplicable here.—Let, then, those who have *thriven*, teach, by their encouragement to the diffusion of agricultural information, those who require it, to *thrive*. It is a duty demanded of them, in return for the blessings they enjoy.

Our new countries, owing to the circumstances in which the first settlers are placed, are incapable of exhibiting patterns in the art of husbandry. This must be done, in our old settlements. It can be, and has been, accomplished; so as to exceed, in uniformly profitable product, any thing known by the cultivators of newly cleared lands. Such lands may, and do, throw up luxuriant crops, for a short period; but their continuance, in a constant and systematical succession, is not experienced. When they are exhausted by bad management, other lands must be sought for; to be also worn out by similar ill-treatment. No farmers of well and long cultivated fields, now wish to sacrifice the remnants of their timber, to the acquisition of a new surface. They know the advantages of renovated old lands. But much as they know, they have yet much to learn. A life may be spent in acquiring information, from individual experience. But knowledge is soon gained, from publications in which

the experience of many is concentrated. It were to be earnestly desired, that our farmers were more generally sensible of this important truth. We have endeavoured to promulgate information, (and should rejoice in additions to it,) highly useful to those, whose lots are cast either in old or new settlements.

If a continuance of the contest in which we are, unhappily, engaged, should turn the attention and industry of many of our citizens who have heretofore been employed in other pursuits, to the choice or necessity of becoming cultivators of our soil; they will profit by, and should encourage, agricultural publications. They know, precedently, the enjoyments of good habitations; and to those they too often sacrifice their means. They should patiently endure privations of their accustomed comfortable dwellings; and yield, in the beginning, a portion of their ease, to the primary object of fertilizing their lands, and cultivating them with judgment. Erecting and ornamenting their buildings and rural accommodations, should be a secondary consideration. Yet mistakes are too frequently made, in this regard. It is, however, indubitably proved, in repeated and encouraging instances, that citizens who have no agricultural prejudices to encounter, and have had intelligence and industry, in business very different from the pursuits of husbandry, have far exceeded old farmers, in their own art. If to them we can furnish any useful lessons, we shall deem our labours well rewarded.

Those who are engaged in the professions and employments requiring a permanent residence in our city, should be more convinced than they have heretofore been, of the obligations they owe to AGRICULTURE. Their daily subsistence, and their necessary comforts, and even luxuries, depend, either directly or consequentially, on THIS FIRST OF ARTS. The better the style of husbandry, the more benefits they derive from it. It is no reasonable excuse for withholding their assistance, or their patronage, that they are

not agriculturists. They possess, and should bestow, the means of promulgating encouragement and information, to those who are engaged in the labours of the field. It has been acknowledged, through all ages, that husbandmen peculiarly require instruction, and fostering care. The greatest characters of either ancient or modern times, have felt, and practiced upon, this important conviction. We make no observations querulously, or reproachfully: persuaded as we are, that many of our intelligent and respectable fellow citizens only require their attention to be called to the subject. If we repeat such remarks, the reiteration flows from our sensibility to their truth. It is also prompted by our mortifying experience of the necessity which curtails and chills our efforts, under the want of the aid our fellow citizens have it in their power to furnish, with ease to themselves, and advantage to their country.

A PATTERN FARM,—a VETERINARY INSTITUTION,—a MANUFACTORY OF AGRICULTURAL INSTRUMENTS,—and a WARE-ROOM in which to exhibit and vend them,—and to receive and show MODELS of all new or useful Implements,—a REPOSITORY of the best *grains, grass-seeds,* and those of *esculent roots,*—seeds of *hedge plants,* as well as those for *Orchardists,* and cultivators of *fruits,*—distributions of cheap TREATISES OR SELECTIONS, on AGRICULTURE, and all subjects connected with it, as school books, and among husbandmen who will not buy expensive publications,—were some of the greater and less objects we aimed at. The whole of these would now have been in progress, if not in complete operation. But our voice has been too feeble, and our influence too limited, to elicit private munificence, or legislative patronage and endowment.

To those who, from insensibility to the true point of the subject, or disinclination to afford assistance, in any way, assert, that "farmers are doing well enough;—and must make their own progress;"—we have nothing to say. We wish them, however, more just and liberal sentiments; and

more worthy of the citizens of a country, the basis of whose strength and prosperity is AGRICULTURE.

Those who feel the importance of generally diffusing agricultural information, and creating a spirit of emulation and improvement; yet believe us (as is too truly the case) incompetent fully to accomplish the task; we cordially invite, to—come and help us.—They may easily bring along with them superior talents; and we earnestly wish they may be accompanied with equally well intentioned zeal, and as persevering endeavours. We have the satisfaction to know, that such endeavours have not been unsuccessfully employed.

Those who look for wonder-working nostrums, by which poor and ill attended grounds can be, at once, made to produce good crops; will be utterly disappointed. Nor will *they* be gratified, who expect lessons, teaching modes of bringing forth salutary and profitable avails, even from fertile soils, without industry, system, and good management. With these, poor lands may be made rich; and rich soils doubly productive.

On those who are so occupied with their own performances, that they turn a deaf ear to all advice not falling in with their own ideas; and who, instead of listening, candidly and patiently, to the experience of others, tested by undeniable principles, and practical facts; fondly descant upon what *they* do, have done, and intend to accomplish, (a propensity too common,)—we can only observe,—*non canemus surdis;*—we do not address those who *will not* hear.

Ours is not a receptacle of controversy. If we or our correspondents are mistaken, (a predicament from which neither we nor they have any pretensions to deem ourselves exempt) we thankfully receive decent and well intended correction. But with those who captiously endeavour to shake, by disputation and misplaced criticism, the influence of useful opinions, without establishing any better in their stead,—we enter not the lists.—It is only for the encouragement of

correspondents who may have unnecessary apprehensions on such subjects, that we make these observations. For ourselves, we have had no important reasons to complain; and we shall carefully avoid affording cause of uneasiness to others.

LAWS

OF THE

PHILADELPHIA SOCIETY

FOR PROMOTING AGRICULTURE.

AS REVISED AND PASSED AT THE ANNUAL MEETING, JANUARY 11, 1814.

I.

THE society shall be stiled, THE PHILADELPHIA SOCIETY FOR PROMOTING AGRICULTURE.

II.

The society's attention shall be confined to agriculture and rural affairs.

III.

The society shall have a president, a first and second vice-president, a treasurer, five curators, a secretary, and an assistant secretary; all of whom shall be annually elected, by the tickets of a majority of the members present, at the stated meeting of the society in January; but if any officer be not elected at the annual meeting in January, the officer not then elected may be chosen at any stated meeting thereafter, on being nominated at a precedent meeting, which nomination shall be duly notified in a public newspaper, in a reasonable time, before the meeting on which a choice is to be made; the persons, so elected, to continue in office one year, and until others shall be chosen in their stead. And in case of any vacancy, by death, resignation, or otherwise,

the same may be supplied by a new election, to be made at any stated meeting of the society; the person thus newly elected, to serve the remainder of the year.

IV.

A quorum for business shall consist of at least five members, including the president or vice-president.

V.

At all meetings of the society, the president shall exercise the usual duties of that office; all motions shall be addressed to him; and on all questions he shall collect and declare the votes. He shall also have power to call special meetings of the society, by notice published in at least two of the city newspapers. In his absence the same duties shall be performed by a vice-president. And if it happen, at any meeting of the society, that both the president and vice-presidents be absent, the members present (being a quorum to constitute a regular meeting for the business to be transacted) may choose a vice-president for that meeting.

VI.

The treasurer shall keep the accounts, methodically stated, in the books of the society; and, when called upon, produce them for inspection. At the last meeting of every year, and also whenever his office ends, he shall produce a fair and regularly stated account of all receipts, payments, and expenditures; and deliver it, together with those books, and all other property of the society, in his hands, to his successor in office, or to the orders of the society.

VII.

The curators are to take the charge and care of all property and articles belonging to the society; the books and papers excepted, which are to remain in charge of the secretary, who is to assist the curators in every thing in which his aid is required.

The curators are to take measures, from time to time, for collecting all native fossils, earths and substances, proper for manures, or deemed so to be: and to cause or procure

the same to be analyzed; and report to the society the results. They are also to procure experiments to be made by careful agriculturists, of any such fossils, earths, or substances; and to promote, in every practicable way, explorations for the discovery of native substances, either known, or presumed, to be manures; or auxiliaries in fertilizing land. They are also to keep minutes of their proceedings, to collect models of the best agricultural instruments; and report their usefulness and properties; and cause such models to be deposited in the apartments of the society. They are to recommend to the society, from time to time, the offering premiums for any discovery or experiment on the foregoing subjects: and to examine into the merits of all claims for premiums, and report their opinions thereon, when the society do not think proper to appoint special committees for the purpose.

VIII.

The secretary and his assistant shall have in charge all the books and papers of the society, and keep the same in exact order. They shall also register all letters which shall be written by the committee of correspondence, or by themselves, by order of the committee.

IX.

At the annual meeting of the society in January, shall be chosen a committee of correspondence, to consist of five members, any three of whom to be a quorum, for the purpose of corresponding with any other society, or persons, touching the objects which this society has in view. The same members shall also be a committee of accounts, to receive and adjust all claims against the society, for its contingent expenses; and the president or vice-president shall give orders on the treasurer for the payment of them.

X.

The stated meetings of the society shall be on the second Tuesday of every month.

XI.

The members of the society shall be distinguished into *resident, honorary, and contributing members.*

Resident members shall consist of persons residing within a convenient distance, to attend the meetings of the Society at Philadelphia; and these are defined to be such only, as at the time of election, reside within ten miles of the said city, on either side of the Delaware. All members of agricultural societies, in other states and countries, with whom this Society shall correspond; and all persons of this state, and of other states and countries, who shall be elected for the purpose, shall be *honorary members*; and are hereby invited to assist at the meetings, whenever they come to Philadelphia. Strangers who desire to be present, as auditors, may be introduced by a resident member.

Honorary contributing members are of the description hereafter mentioned.

Every citizen contributing, and paying into the hands of the treasurer, a sum not less than FIFTY DOLLARS, may be elected, agreeably to the rules, an *honorary member*; without regard to place of residence. Those who thus laudably enable the Society to extend its usefulness, and promote its objects, are invited to assist at its meetings. They will be styled *honorary contributing members.*

All donations and bequests for general purposes, shall be faithfully used; and regular accounts kept of their application.

Such donations or bequests as are given, granted, made or devised, on terms directing their being used in, or applied to, any particular branch or branches of husbandry, or rural œconomy; or subjects connected therewith, shall, with all due fidelity, be so used or applied. And if they, or any of them, shall not be, at the time, sufficient to accomplish the object designated, in whole or in part, they and every of them, shall be placed in a situation, if practicable,

to accumulate; until by additions of other means, the object intended can be effectuated.

The names, and amount and description of donations, of all citizens contributing pecuniary or other donations, of any amount or description whatever, shall be registered, in a roll kept for that special purpose. They will merit and receive the thanks of the society, for the patriotism and public spirit, evinced by their thus affording the means of accomplishing the objects of the institution.

XII.

New members, whether *resident* or *honorary*, shall be elected by ballot. And the secretary shall issue notice to each person, of his being elected, to the following purport —*The Philadelphia Society for promoting Agriculture, have elected a (resident or honorary) member, in testimony of their confidence in his capacity and inclination to promote the objects of their institution.*

XIII.

All elections and appointments shall be between eight and nine o'clock in the evening, at one of the stated meetings of the society. And no person shall be elected a member, whether resident or honorary, unless, at a preceding stated meeting, he shall have been openly proposed, and such nomination duly entered on the minutes of the society. The nomination and election to be in the absence of the candidate.

XIV.

The society shall annually propose prizes upon interesting subjects, relative to actual experiments and improvements, and for the best pieces written on proposed subjects. And in order more effectually to disseminate the knowledge of useful discoveries and improvements in husbandry, the society will, from time to time, publish collections of memoirs and observations, selected from such communications as shall be made to them. To promote these views, the

friends of agriculture are invited to assist the society with information of experiments and incidents in husbandry.

XV.

All claims of prizes shall be sent in writing; and when read, the society shall determine which of the claims, relative to each prize, shall be selected for their definitive judgment, on a future comparison. This judgment is to be given at the stated meeting on the second Tuesday in February, but previously to such determination, all such claims shall be submitted to, and reported upon by the curators. If it happen, in any case, that there be no competition for a prize, but only a single claim, the society will consider such claim; and if the claim or claims be supported answerably to the views and just expectations of the society, the prize proposed shall be decreed. Premiums and prizes are equally due to any persons residing in any of the United States, according to the merit of their respective exhibitions.

XVI.

For the purpose of defraying the necessary expenses of the society, for premiums and prizes, books on agriculture, improved instruments of husbandry, and other important objects and contingencies, every member shall annually pay to the treasurer a contribution of THREE DOLLARS, and any member paying THIRTY DOLLARS, shall be considered a member for life; and shall not be called on for any farther annual payments. This contribution shall be considered as due and payable at or before the last day of December, in every year. And at the first meeting in January of every year, the treasurer shall lay before the society a list of the members, specifying who have, and who have not paid their contributions; and any member whose contribution shall be found to be more than two years in arrears, after the same shall have become due and payable, as aforesaid, provided payment thereof has been personally demanded of him by

the treasurer, or collector, authorised by him for the purpose, such member shall be considered as withdrawing from the society, and be no longer deemed a member of it; and the same shall be entered on the minutes.

XVII.

New rules, or alterations to be made in old rules, (except at the annual meeting in January,) shall be proposed, and the proposal entered on the minutes, at a preceding stated meeting; and may then be made by not less than two thirds of the members present.

XVIII.

When any part of the society's funds is to be disposed of, (excepting at the annual meeting, or for ordinary contingent expenses) the same shall be done at a stated or special meeting, after having been proposed at a previous stated meeting.

XIX.

Still further to advance the objects of this institution, the society will promote the establishment of other similar societies in the United States.

XX.

On the first meeting of the society in January, in every year, there shall be a revision of the then subsisting rules; and the same shall stand confirmed, so far as two thirds of the members present, including the president or a vice-president, do not revoke or alter them.

OFFICERS

OF THE

PHILADELPHIA SOCIETY

FOR PROMOTING AGRICULTURE.

ELECTED AT THE ANNUAL MEETING, JANUARY 11, 1814.

PRESIDENT——————RICHARD PETERS.
VICE-PRESIDENT——WILLIAM TILGHMAN.
TREASURER——————EDWARD BURD.
SECRETARY——————JAMES MEASE.
ASSISTANT SECRETARY-ROBERTS VAUX.

CORRESPONDING COMMITTEE.

RICHARD PETERS.
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A LIST

OF THE

MEMBERS

OF THE

PHILADELPHIA SOCIETY

FOR PROMOTING AGRICULTURE.

ELECTED SINCE THE PUBLICATION OF THE LAST VOLUME.

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The Society's Medal.

2. Reverse.

EXPLANATION OF THE MEDAL.

1. A plough;—and oxen, at rest. One pawing;—impatient under idleness;—the other, looking for the arrival of the ploughman.—This emblem is preferred to the plough with horses;—to show, emphatically, the Society's desire to encourage the use of oxen, and the breeding of cattle.

EXPLANATION OF THE REVERSE.

2. Agricultural implements; honourable badges of husbandmen. More estimable and generally useful, than armorial bearings.

☞ *A space is reserved for engraving the cause and occasion inducing the mark of approbation bestowed.*

The engraver has unfortunately not given the corporate title of the Society, which is, "The Philadelphia Society for promoting Agriculture."

At a stated meeting of the Philadelphia Society for promoting Agriculture, July 12th, 1814, the following resolution was on motion unanimously passed.

The society having been long impressed with the importance of veterinary knowledge, and having offered a premium for the best essay thereon, are with great satisfaction informed of the merit of a course of lectures, delivered last winter, by Dr. Mease, on "comparative anatomy and the diseases of domestic animals;" whereupon resolved,

That Dr. Mease be requested by the president to permit the introductory lecture, on the subject mentioned, to be printed in the third volume of the Memoirs of the Society.

INTRODUCTORY LECTURE

TO

A COURSE OF LECTURES

UPON

COMPARATIVE ANATOMY,

AND

THE DISEASES OF DOMESTIC ANIMALS.

BY JAMES MEASE, M. D.

DELIVERED NOVEMBER 3, 1814.

GENTLEMEN,

A conviction of the great necessity at present of a course of lectures upon COMPARATIVE ANATOMY, and the DISEASES of DOMESTIC ANIMALS, has induced me to undertake to deliver them. I had indeed contemplated a course on the last subject, several years since, but was prevented from commencing it, by circumstances that no longer exist. The diffusion of knowledge upon the subject of my intended course, although at all times desirable, from mere motives of humanity, as connected with the means of increasing the comfort of a class of animals over which Providence has made us masters, who labour for us, feed, and clothe us; is particularly important, if we reflect upon the value of some of those animals at the present time, when a laudable spirit of improvement induces agricultural gentlemen to stock their farms at a considerable expense, with foreign breeds, or to take great pains in originating new stock at home, for the purpose of increasing the quantity and quality of flesh, milk, or fleece; and when the employment of a large body of ca-

valry is rendered necessary, by the war in which the United States are engaged.—But independently of this latter consideration, which is of a public nature, and certainly of sufficient consequence to claim the notice of government; if the noble animal, the horse, considered in a domestic view, were alone the object of our attention, the importance and high value set upon him, when his powers for either speed or draught, or the beauty of his form have been greatly improved, would be an inducement sufficiently great to authorise a course of instruction upon his structure, diseases, and the means of preserving his health.

As it is very probable that a part of my hearers are entirely unacquainted with the subject upon which I am to lecture, and even with the meaning of the words "*Comparative Anatomy*," it is due to the importance of this branch of knowledge to explain them, to show what attention the study has excited in the old world, to enumerate the names of the distinguished characters who have cultivated it, and to lay before you the very great benefits derived from it, in elucidating the structure and functions of the human body, and explaining the doctrines of its physiology: in aiding the *Painter*, *Sculptor*, and *Engraver*, and lastly, to point out its intimate connexion with VETERINARY MEDICINE.

By the term "Comparative Anatomy" is understood, the investigation of the structure of brute animals; and its objects are to demonstrate the diversity that exists among similar organs, and analogous parts, and to compare them with one another, and with man.

It is reasonable to suppose that this study must have attracted the attention of mankind in very early times. The slaughter of animals for food, the preparation of the offerings on the altar by the priest, and the custom of deducing auguries from the state of the entrails, would naturally lead to some knowledge of the structure and appearances of the parts: we know likewise, from the book of Exodus, that names were even attached to them, and the parts declared to be clean, and unclean, are particularly designated. But Greece first distinguished itself among nations, in the study of anatomy, as a science, as it did in the study and practice of the fine arts; and Homer,[1] by the familiar use of several anatomical terms, and the mention of certain parts of the body, and their connexion with each other, shows that some knowledge of the structure of the human frame was then extant. Pythagoras, after an extensive tour to India and Egypt, brought to his native country, the knowledge on all subjects to be acquired at that time, and of anatomy among others, and disseminated it among his countrymen, with great ardour. His pupils, Alcmeon and Empedocles, but more especially Democritus of Abdera, extended the fame of their master, and raised themselves to deserved eminence among the philosophers of that day. Upon the supposition that all the disorders of the human body proceeded from bile, he endeavoured to discover its origin and course, and by the ardour of his pursuits, and consequent frequent seclusion from the public, laboured under the imputation of insanity, until the sage Hippocrates, who was sent to visit him, discovered his retreat, and while he undeceived his fellow citizens, with respect to his mental derangement, did ample justice to his industry and merits.

Aristotle, however, was the first scientific anatomist: he enjoyed particular advantages under the patronage of his pupil, Alexander the Great, who granted him a very large sum of money, to purchase animals for dissection, and to defray the expenses attending his studies. He did honour to the munificence of his royal patron, by his attention to, and improvement of the subject: his regular anatomical works have been lost, but he has given much comparative anatomy in the first part of his treatise on animals, and he has formed an anatomical nomenclature, which is in part still received. Without dwelling on the labours of Diocles of Carystus, and of Praxagoras of Cos, I shall pass on to mention the

successors of Aristotle, viz. Erasistratus his grandson, and Herophilus, who having been protected and employed by the Ptolemies, sustained the character of the school of Alexandria so well, that, during their lives, and for a long time after, it continued the chief place of resort for students, from all nations.

About the year 160 of the Christian account, Galen, a name familiar to the whole world, settled at Rome, and contributed very largely to the advancement of medical science generally, and particularly of anatomy, by his talents, industry in experiments and dissections, and by collecting together all that had been previously written on the subject by the Greek teachers.[2] After his days we have no account of any addition having been made to the previous knowledge, in either human or comparative anatomy, for a very long time. To this suspension of the labours of science, the decay and division of the Roman empire, in the close of the second century, greatly contributed; but the finishing stroke to all liberal studies or mental improvement, in the western parts of Europe, was given by the irruption of the Barbarian tribes of Germany and Scythia, first into Rome, in 410, under Alaric, and finally over the whole of Italy, Gaul, and Spain, at different times afterwards, until the year 476, when the Roman empire was finally extinguished in the West.

A long interval of midnight darkness in science of every kind, succeeded in the western parts of Europe. The Saracens were at length, in their turn, destined to be the rulers of the former seat of learning and of the liberal arts in the East, and for a long time they did little except destroy. The burning of the library of Alexandria will forever remain a splendid monument of their fanatic barbarity.[3] Their successors were fortunately better disposed, and encouraged the arts,[4] and after the subversion of the Visigoths in Spain, Arabian learning was introduced by them into that country, (anno 710,) where it maintained its ground, and spread through

western Europe, until the æra when the genuine spirit for improvement and for science began to appear in the world. A worse enemy to science than even the Saracens originally had been, succeeded in the Turks, who from their first descent on the great theatre of the world, from the mountainous regions of Taurus and Imaus, to the present day, have uniformly evinced a settled hostility to improvement and innovation of any kind. In 1055 they pillaged Bagdad, and the ruin of that seat of splendor and of learning, was completed by the Moguls in 1258. In the progress of their victories, but not until after a long siege, the Turks became masters of Constantinople, (the last remnant of the Roman empire,) in the year 1453, and thus became the unwilling instruments of the diffusion of learning and the arts throughout Europe: for the philosophers who had made that city their place of residence, after having been driven from Rome, fled to the Italian states for protection, bringing with them their own works, and those of the Greek authors in their original dress, and fortunately found the people eager to receive the information they had to communicate; and, what was of most consequence, the different rulers of the country were disposed to afford them all the protection and support they desired. This spirit for the liberal arts had been revived, in part, in consequence of the acquaintance which the crusaders had made with Arabian learning, during their chivalrous expeditions to the holy land; and the means of gratifying it had been already obtained, by the discovery of the mode of making paper, in the eleventh century, and had been powerfully promoted by that of the precious art of printing, in the year 1445, which facilitated the multiplication of copies of books.

Europe thus enriched and roused made some progress in medical literature, and in anatomy, but it was slow; the popular prejudices, nay the abhorrence against touching dead bodies, and much more against their patient examination, long continued in almost all countries except Italy, and the

consequence was, that Italy was the country in which human and comparative anatomy was for a long time chiefly taught.

Upon the general diffusion of the spirit of inquiry in Europe, which continued to take place, the study of human and comparative anatomy kept equal pace; for nearly all those eminent men who attended to one branch, were zealous in the prosecution of the other. But the sixteenth century may be considered as the æra whence we must date the revival of anatomical knowledge in general; during which, we find among others that might be mentioned, the names of Vesalius, Fallopius, Eustachius, and Fabricius,[5] prominent as teachers. The science was prosecuted with additional spirit in the succeeding century, after the doctrine of the circulation of the blood had been taught by Harvey in London; and more especially after his publication of the great discovery in 1628, when a new field was opened, from which both branches of our subject derived important benefits, by the new stimulus to experiment which it excited, and by enabling medical men to illustrate many points, before inexplicable, relative to the animal economy. In the course of the 17th, and the early part of the 18th century, the world was favoured with the labours of Grew,[6] Willis,[7] Tyson,[8] Collins,[9] Lower,[10] Keill, and others in England; Peyer,[11] in Switzerland; De Graaf,[12] Leewenhoek,[13] Blazius,[14] Swammerdam,[15] Ruysch,[16] Steno, and others in Germany and the Netherlands; Rudbeck[17] in Sweden; and Bartholine[18] in Denmark; Bellini, Valisneri, Malphigi,[19] and Redi, in Italy; Casserius,[20] Perrault, G. J. Duverney,[21] and others, in France. The collection of facts made by the foregoing anatomists was great, no complete system however was formed, until about the middle and latter end of the last century, when the observations of preceding authors were arranged, and the science was prosecuted with new ardour. We were then favoured with the discoveries of D'Aubenton,[22] the friend and coadjutor of the Count de Buffon, in his great work on natural history, and Vic D'Azyr,[23] in

France; Camper[24] and Sandifort, in Holland; Pallas, in Russia; the illustrious Haller, professor at Gottingen; Scarpa and Camparetti, in Italy. In England, we are indebted to William and John Hunter, Hewson, Home, M'Cartney, A. Cooper, Townson, Haighton, Cruikshank, and others, and in Scotland, to the two Munros (1st and 2nd,) for the elucidation of the organs of various animals, and for very considerable additions to our stock of knowledge on the subject. Lastly, Cuvier,[25] of Paris, and Blumenbach,[26] of Gottingen, may justly be considered as the most eminent contributors to comparative anatomy, in modern times.

It would be tedious to detail the particular animals and subjects, to the investigation and dissection of which, these illustrious men devoted their attention; it may be therefore only necessary to say, that scarcely any part of the animal creation, from the colossal elephant to the crawling caterpillar, escaped their attention; and that from all of their labours, instruction of the most useful kind, and from some of them, of the most pleasing nature, has been derived.

I shall now proceed to enumerate the advantages that have resulted to mankind from the prosecution of comparative anatomy.

Every well read medical man, who, not content with knowing merely the present state of the science of medicine and the art of surgery, has investigated the progress of their improvement, must be acquainted with the essential services which have been rendered to both professions by comparative anatomy; yet as some of my hearers are not expected to be informed on this subject, it is due to the study, and may not prove uninteresting to them, to give a short account of the benefits which have resulted from it.

1. The study of comparative anatomy opens to the mind a source of the highest satisfaction and interest, and tends most powerfully to give exalted ideas of the wisdom of the Author of all existence. In the words of the eloquent Herder, it "gives man a *clew* to himself, which conducts him

through the great labyrinth of living creation; and if we can say of any method, that through it our understanding ventures to scrutinize the profound and comprehensive mind of God, it must be this."[27] From a very slight knowledge of the structure of the human frame, the royal psalmist was enabled to exclaim, "man is fearfully and wonderfully made," and had he been acquainted with the structure of the inferior order of animals, he would have found in them additional sources of wonder and of praise, from contemplating the infinite variety of modes in which the same functions are performed in different animals, and in tracing the contrivances and structure of the organs and general mechanism of their frames, which are so nicely adapted to their different economies and necessities, whether their residence be in air, in water, or on land.

2. In the early stages of society, this study materially promoted the knowledge of the structure of the human body: for owing to the invincible prejudices against human dissections, and the prevalence of the opinion that the handling of a dead body communicated a degree of moral pollution to the living, it was extremely difficult to procure human bodies for the purpose of examination, and injurious to the reputation of medical men to dissect them even if procured. The ancient physicians therefore were under the necessity of drawing their inferences with respect to the anatomy of the human body, and the use of its various organs, from brute animals; and apes, probably from their external form more nearly than any other animal, resembling that of man, were the chief subjects of investigation; and we know from the disagreement of Galen's account of the structure of various parts of the body, with what has been ascertained by anatomists in later times, and from recent dissections of those animals, that it was from them his descriptions were chiefly taken.[28]

3. Upon various questions of physiology, which from their nature could not be ascertained in the human subject, this

study has rendered the most essential services. The deer, in the park of king Charles the first, with which he generously furnished Dr. Harvey, served to make some progress in the discovery of the process of the evolution of the fœtus; a subject that has since been greatly elucidated by De Graaf, Spalanzani, Dr. Haighton,[29] and Mr. Cruikshank.[30] By experiments on other animals, Dr. Harvey also ascertained, beyond contradiction, the circulation of the blood through the body, and its rotatory motion by the heart arteries and veins, so as to make many complete circuits round the body in twenty hours.[31]

4. It is to comparative anatomy we owe the discovery of the lymphatic system, and the certainty of the use it was intended to perform in the human body. The office of this admirable and curious system of vessels, is to absorb and convey back to the blood, all the decayed parts of the human body, (even bone itself,) and all those thin, pellucid fluids, that wander from the course of the circulation, that they may undergo new preparations, or be thrown entirely out of the body: and in the intestines, they perform the important office of conveying the nutritious and watery part of the food into the system. Hence they arise from every organ of the body. An opinion may be formed of the active power possessed by those apparently tender, and minute vessels, from considering the rapidity with which they transmit their contents: this has been satisfactorily ascertained by Mr. Cruikshank, to be at the rate of twenty feet in length, in one minute. His experiments were made upon dogs, and the well known facts of a peculiar smell in the urine, being perceived in less than one hour after eating asparagus and certain species of cabbage; and the increase of urine in the same space of time, after drinking certain mineral waters, lead us to suppose that the activity of the lacteals in man, is equally great.[32]

5. It is to this study we owe the discoveries of the celebrated Italian professor Spalanzani, Dr. Stevens, John Hun-

ter, and others, on the digestion of food in the human stomach, and in many other animals, about which process various erroneous theories had been previously entertained. The consideration of this process, as conducted in animals, with an examination of the admirable organs for the purpose, will form a very interesting part of our course.[33]

6. "Comparative anatomy becomes necessary in ascertaining the action of organs. All the functions have ceased long before the human body can be opened, and it is only in the inferior animals that we can presume to make experiments examining the movements of the different organs before the principle of life has escaped." It is chiefly in this field of inquiry, that we have obtained the correct knowledge which we now possess, of many of the animal functions.[34] Nor can the supposition be admitted, that this study savours of cruelty: every humane mind is shocked at the idea of wantonly giving pain to any animal; but when such pain is requisite to illustrate the animal physiology, the sacrifice is indispensable and justifiable. Without it, we might, in all probability, have been ignorant at this day of the sublime discovery of the circulation of the blood, and deprived of the important benefits resulting from it to mankind.

7. By comparing the internal organization of different animals, we are enabled to distinguish those parts which are common in the structure of every animal body, and essentially necessary for the performance of the vital functions; from such as are peculiar to certain animals, and exclusively subservient to their necessities, economy, or enjoyment. Thus when we find particular organs imperfectly developed in certain animals, or extracted[35] in some, and naturally wanting in a third, without any essential injury to life, we are then enabled to judge of the rank which these organs hold even in the human species: and by the circumstance of life being supported, and the functions of the body going on, after a cessation in the performance of certain functions, we are not only taught the propriety of attempting the saving of life, under circumstances which without such knowledge would have been deemed impossible; but are induced to admire the wonderful kindness of Providence, in furnishing the system with resources, which enables it to survive after such serious privations, and outrages to the animal economy. We had long known that in the operation for aneurism, where a wounded or diseased artery is taken up, and completely divided at the elbow, or in a thigh; the parts below are supplied with blood by the anastomosing branches given off from the larger artery, above the point of obstruction; but Mr. Astley Cooper, of London, has shown us, that even the carotids, the femoral, and brachial arteries of a dog, in which the stoppage of circulation, it might naturally be supposed would be followed by death; may be tied with impunity: nay, that the aorta of the same animal may be tied and divided without injury to his health;[36] and hence we are taught the propriety of attempting the saving of a human life, by ligature, in case of a wound in the large arteries of the body, instead of amputating the limb. To military or naval surgeons, who are often called upon suddenly to exert their skill, in cases of dreadful wounds, the inferences to be drawn from Mr. Cooper's experiments are invaluable.[37]

8. It was by the study of comparative anatomy that we have ascertained the cause, why ouran-outangs, apes and monkeys cannot speak. J. J. Rousseau, with the strangest inconsistency, while he laboured to perfect his system, by which human reason and the human powers were to attain the highest possible exaltation; absurdly wished to degrade man by assimilating his nature to that of brutes, and asserting that those animals had originally been endowed with the divine faculty of speech, but had lost it from disuse. Although the assertion or opinion was contradicted, by the negative fact, that no savage nation had been discovered without an artificial language, while herds of ourans had been found, without any; yet no public refutation had ever been made, of this absurd opinion, until after the year 1779, when

the excellent professor Camper of Holland, by dissecting several ourans, apes and monkeys, demonstrated that no modulation of the voice, resembling human speech, can be produced in those creatures, because the air passing through the rima glottidis, (or chink on the top of the wind pipe,) enters a slit or hole at the root of the epiglottis, and is lost in two ventricles or hollow bags in the neck, causing it to swell, and out of which the air is returned, by the contraction of the muscle over them, without any force or melody, within their throat and mouth.[38]

9. It is essential to the study of natural history: for anatomical structure is the only true basis of a natural classification of the animal kingdom. It was owing to his not being conversant with comparative anatomy, that the zoological arrangement of the celebrated Linnæus is deficient; and to an opposite reason may be ascribed the admirable and comprehensive classification of the French naturalists.

10. An attention to this study has enabled us to explain the facts related by some travellers, the extraordinary nature of which had occasioned an unbelief in them, and the imputation of a disregard to truth.—I allude to the narratives of the surprising power of the camel to take in at one time a sufficient quantity of water to last four or five days, and thereby to become capable of inhabiting the parching deserts of Arabia; and of the practice of the people of a caravan, of opening those animals when they die, in order to obtain the water from their stomachs.—The examination of the stomach of this useful animal, shows how it is enabled to retain the water, and that it is pure enough to be drank when taken from his body, by men whose thirst is great.[39]

11. But while comparative anatomy enables us to do justice to travellers, it also furnishes us with the means of putting to the test the truth of various stories of the vulgar, some of which have been unaccountably admitted by men of science.[40] Such, among others that might be mentioned,

is that of the submersion of swallows in rivers, creeks, or ponds, during the winter, which has long been implicitly believed.[41]

12. A knowledge of the principles of comparative anatomy are as essential to the landscape painter, sculptor and engraver, as the knowledge of the human anatomy is to the painter of mankind. An artist may indeed depict upon canvass an animal, which without an inscription under it, may be known to be of the species intended to be represented; but unless he is acquainted with the relative and natural proportions and forms, which modern improvements have shown are connected with not only beauty of person but profit, he will not reach that perfection in his portraits or delineations, nor produce that effect by his labours, which is at all times desirable. It was this knowledge that has rendered the engraved figures of the horse, by Stubbs, so much and so justly admired, although done so many years since, (1766, London;) and which contributed greatly to the reputation of the painter Adrian Vandervelde,[42] and a few others; and although a minute knowledge of the anatomy of all animals is not expected from an artist, yet an acquaintance with the structure and mechanism, peculiar to each, is essentially necessary to enable him to delineate the muscles, and their action in various positions of the body, and to prevent the commission of those gross absurdities we sometimes see in statues and paintings, such as a walking horse represented with two diametric opposite feet in an elevated position.[43]

13. Comparative anatomy is as essential to the successful practice of veterinary medicine, as a knowledge of the structure of the human body is to the cure of the diseases and accidents incident to mankind. It is owing to a want of this knowledge of their structure, that our useful domestic animals are so mismanaged by farriers, and pretenders to animal medicine; and that diseases, trivial in their nature, or that slight surgical cases often end in death, or lameness,

which might have been easily prevented by a scientific treatment.

The aid which comparative anatomy is capable of affording to veterinary medicine, must be evident to every one who reflects a moment upon the subject.

"The veterinary art is a practical application of scientific principles, to the preservation of the health of domestic animals, and to the cure of their diseases, in the same manner as the art of medicine applies to the health and preservation of man: and the science on which this art is grounded, and which it requires for its perfect exercise, comprises the natural history, anatomy, physiology, and pathology of those animals, together with such portions of the vegetable and mineral kingdoms as are connected with them, either in the way of aliment or remedy.

"To practice this art with certainty, it is necessary to make a special and accurate investigation of the economy of the animal itself, and to observe minutely the different effects that the different subjects of the materia medica might have upon it, and to repeat those inquiries with the same exactness, for every animal that is the subject of the art; and moreover, to superadd such knowledge of the human anatomy, as may be of use in the way of comparison."[44] A plan of study like this, requires a leisure and education, far beyond the capacities and circumstances of those to whom the care of our animals has been hitherto abandoned, and yet such is the importance of the art, that a course of study as long and as circumstantial as that just detailed, is indispensable for those who would fully, fairly, and honourably engage in the exercise of it; nay, from the inability of the sick animal to describe his feelings, and to point out the seat of his pain, his pathology must necessarily be uncertain, and consequently we might suppose, that a greater degree of judgment and penetration are requisite for the physician of animals than of mankind. What then must be the feelings

of any humane mind, to have a favourite horse, which may have greatly contributed to his comfort, health or pleasure, committed to the care of the most ignorant smith or farrier, whose stock of knowledge may consist in knowing how to ruin the poor animal's foot, by bad shoeing, or in giving him when sick, the same drench from a horn, whether the disease be pleurisy or colic? This regret will necessarily continue so long as veterinary medicine is not studied scientifically, or until medical gentlemen cease to think it beneath their notice; and I may add, until the owners of fine horses will by pecuniary rewards, encourage men of respectability and knowledge to engage in its practice. Further, it is a truth, that nature, amidst the infinite variety in structure, seems to have fashioned all the living creatures on our earth after one grand model of organization: this is more especially the case with those composing the extensive class mammalia, of which man is the head.

The bones, the muscles, the vessels, the nerves, the organs that prepare and secrete the various fluids of the body, and those of the different senses, seem to be substantially the same; except as regards some difference in form, size and position, arising from the peculiar wants of each animal.

The diseases of mankind and of some animals, particularly the horse, are moreover very similar. Independently of the various accidents requiring the aid of surgery, such as wounds and fractures of bones; the horse is also subject to fever, pleurisy, dropsy in the brain, severe catarrh, violent colics, dysury or difficulty in staling, diabetes or a preternatural flow of urine, various kinds of worms, epilepsy, asthma, locked jaw, and other complaints: with the locked jaw, many horses are carried off in this city every year.

The Goitre or swelled neck, which is so prevalent a complaint among the inhabitants of Switzerland, of Thibet, and other countries of the old world, and also in the new frontier settlements of the United States, attacks sheep and calves

in this country, and dogs in Switzerland according to Mr. Coxe. From my inquiries into this complaint, as it exists in the United States, I have ascertained that it invariably disappears when the land is well cultivated, and drained. But the fact is far otherwise in the other quarters of the globe; there it seems to be indissolubly connected with the climate and soil.

Calves are also subject to the croup or hives,[45] and dogs, sheep and hogs to inveterate cutaneous eruptions.

Dr. Sims, president of the Medical Society of London, says he knows the mange in dogs and cats will give the itch, and that of two sorts, the one being evidently larger than the other;[46] and a friend of mine was affected with a large pustule, similar to the chicken pock, from touching his face after handling an imported merino sheep, at the time the animal was affected with the disease called by the French, olaveau, or sheep-pock. Poultry have their peculiar diseases, as the gaps in fowls,[47] and dropsy in the craws of turkeys.

If we consider the present state of animal medicine in this country, under its appellation of farriery, we see it in as deplorable a situation, as was the art of medicine, during the barbarous ages, when the gross ignorance of its professors brought disgrace upon the art itself, and when many diseases, which now yield readily to judicious treatment, raged without controul; yet that the veterinary art, like human medicine, in the hands of a judicious person, is made respectable, we may see by the example of ancient times, and by the present example of several nations of Europe. If we look into ancient history, we find that before the downfall of the Roman empire, which crushed in its ruins all arts and sciences, veterinary medicine was esteemed among the most important objects, and worthy the consideration of an inquiring mind. Connected on the one hand with human medicine, and on the other with agriculture, it both enlarged the stock of human knowledge, and improved an important

branch of rural economy.[48] The venerable Hippocrates wrote a treatise upon the subject.—In Carthage, Mago composed an elaborate work on rural and veterinary medicine.—Columella, who lived about the fiftieth year of the Christian account, devoted four books, out of twelve on husbandry in general, to veterinary medicine. Cato, Varro, Pliny, and Vegetius, (A. C. 300,) also laboured to serve veterinary medicine.—Indeed I find from my researches on this subject, that the course of human and animal medicine proceeded together, until they both fell at the irruption of ignorance and barbarity into Europe, in the third and fourth centuries; but at the revival of knowledge, and of a spirit of inquiry, while the intrinsic value of the life of man animated those labours which have advanced human medicine to its present state of perfection, it was the undeserved lot of veterinary medicine to be excluded from the asylum of the sciences, and to be left to the undisturbed possession of the most illiterate and obstinate of men.—To withdraw it from its obscurity, and to restore it to that rank among the arts and sciences which it was its right to hold, was a merit reserved to France. So long back as the beginning of the sixteenth century, Ruellius compiled by order of Francis the first, a large assemblage of veterinary matter, which he translated into Latin, and published in folio, in the most splendid style, at the expense of his king. Afterwards, the government of the same country, under Lewis the fourteenth, formed the first establishment for studying the diseases of animals; and in the year 1762, a regular school was founded at Lyons, in France, for the study and improvement of veterinary science, with every convenience for that purpose; apartments for dissections, with a botanic garden, and professors in chemistry and materia medica, and others to teach the anatomical structure of animals in general; with the nature and cure of the diseases incidental to them, that thereby the whole nation might be provided with skilful farriers.[49] This shortly after gave rise to a similar one near Paris, and

at present veterinary schools are as regularly organized throughout France, as schools for arts and sciences. The celebrated D'Aubenton, the friend of the count de Buffon, presided over the school at Charenton, and afterwards at Rambouillet, on the removal of the national farm to that place. All these establishments being directed by men of zeal and science, and set on foot and supported by government, gave a degree of respectability unknown before to the study, and so completely removed all former prejudices against it, that it soon afterwards became very generally cultivated by people of education throughout the kingdom.

The example set by France was soon followed in Vienna by Maria Theresa, and her successor Joseph the second; by Denmark, Sweden, and Prussia; and last of all England.—The veterinary college was established in London in the year 1790; and 1500 pounds sterling are annually granted by government for its support. No person is permitted to offer as a candidate for the post of veterinary surgeon in the army, without attending a stated time, the lectures and demonstrations of the professor, and undergoing an examination, conducted by some of the most eminent medical and surgical characters in London, who from patriotic motives take on themselves that trouble. The professor of the college is Edward Coleman, a regular bred surgeon. The Dublin society, which is liberally endowed by the government of that country, and which has done so much for the improvement of Ireland, has also established a veterinary professorship, and a regular bred physician (Dr. Peel) gives lectures on the subject.

It remains for this country, in which the spirit for improvement in stock of every kind is so visibly increasing, and the value of which is enhanced by the high price and the growing demand for some of them; to follow those examples; and by advancing the art to a height as yet unattained, to make it amends for the neglect we have hitherto shown it. Indeed I am persuaded that in a short time the

public attention will be called to the subject, and that men of education will think it no derogation from their medical character, to become acquainted with the diseases of cattle, or to lend their aid in the removal of them when required; and thus rescue our useful animals from the unqualified hands to whose care they must otherwise, as at present, from necessity be committed.

A distinction must be made between veterinary medicine and farriery. The first is founded upon science, whereas farriery disclaiming any connexion with science, proves itself a mere practice, habit or routine, and as it rests on nothing regular or solid, so it must ever be variable. The course of veterinary medicine and farriery are indeed the same, but with this difference, that the former condescends to admit a guide, while the latter prefers to ramble at risk and hazard. Were their objects any way different, farriery would have a plea for rejecting the assistance of veterinary science, founded on the peculiarity of its own object. But they are strictly the same, so that the only alternative might be in the superior excellence of the means by which it endeavours to acquire it. But we know that farriery pretends to no such means, that its practice is a collection of prescriptions and operations, without rule or precision, communicable to any body, in the form of a pamphlet. With this view of the subject, how is it possible that we can sacrifice so much of our common prudence, as to give to it any portion of that confidence which medicine itself is only capable of exacting from us, in proportion as it exhibits a quite opposite character.[50]

Such being the facts with respect to the knowledge required for the veterinary practitioner, and such the distinction between veterinary science and farriery, let us inquire into the inducements and necessity that exist for acquiring the knowledge of this branch of the medical profession.

1. The importance of the subject.

The argument derived from this source rests on the *value*

of cattle, as they are a source of public and private opulence; the means of our subsistence, and the instruments of our convenience and pleasure. This value, I repeat, is daily increasing, owing to the spirit for improvement now spreading through the United States, and to the high price of some stock, particularly fine woolled sheep, the demand for which even in the case of peace, will rapidly increase, from the mere increase of population.

2. The veterinary science offers a new and respectable means of employment to its professors.

It must be obvious, that to the medical practitioner in the country, the knowledge of the diseases of domestic animals will be the means of not only greatly extending the sphere of his utility, but his personal consideration, particularly with respect to the noble animal the horse, which always contributes so largely to our wants, which augments our enjoyments, and preserves our health, and is on many occasions an object of particular interest, from the circumstances of cost and individual merits. Will the young practitioner think that he derogates from his medical dignity by performing an act of humanity, and extending the sphere of his usefulness in any way connected with the exercise of his profession, especially in one that has engaged the attention and labour of some of the most eminent men, both of ancient and modern time, in Europe?—Will he derive no satisfaction—nay more, will he not add to his medical eclat, or obtain pecuniary recompense, from saving the life of a favourite racer of a sportsman, or the hackney of a wealthy invalid? Will he not think himself well employed in setting the leg of a horse of the hunter breed, so valuable for cavalry, and the carriage, and which, although no longer able in consequence of the accident to shine in the field, may still propagate his valuable race?

3. In the United States, an additional necessity for attention to improvement in our knowledge of veterinary medicine arises not only from the fact of our ignorance of the subject; but of our stock being liable as well to the common diseases to which they are from their nature exposed in all countries, as to peculiarly fatal diseases, the origin of which is involved in great obscurity.

In the states of South Carolina and Georgia, cattle brought from Europe, or from the interior, to the vicinity of the sea, are invariably attacked by a disease which is generally fatal. Cattle from the interior of the state of South Carolina, (but only a particular district,) so certainly disease all others with which they mix in their progress to the north, that I am told they are prohibited by the people of Virginia from passing through the state. A singular fact attending the disease is, that the cattle alluded to, have the power of infecting others with which they associate, while they themselves are in perfect health;[51] this I can assert from my own personal observation, in the year 1796. The particulars of this singular but fatal complaint I shall hereafter detail. Pennsylvania has to regret the loss of many thousand horses, by a disease which deserves no other name than yellow fever. I allude to the "*yellow water,*" the symptoms and method of cure of which are totally different from the jaundice, yellows, or yellow water of Europe. This disease, I have reason to believe, is peculiar to North America.[52]

Europe furnishes no disease similar to the mortification in the limbs of the New England cattle;[53] nor to that peculiar salivation which has within the last twenty years attacked our horses, from eating second crop grass, particularly red clover,[54] and which from its debilitating effects, amounts to a disease. For the last four or five months, a new and very fatal disease has prevailed among the horses in the vicinity of New Brunswick, New Jersey.

4. It has already been shown, that by means of comparative anatomy we have ascertained the uses of various organs of the human body; and I now can add, that by an attention to the diseases of brute animals, the following advantages have also resulted to mankind.

1. We have been enabled to obtain precise ideas of the nature and seat of some serious diseases of the animal frame. Of the facts illustrative of this position, one of the most important to mankind is the knowledge of the cause of the local and general disease that sometimes succeeds the operation of bleeding in the arm.—For a long time the inflammation and suppuration beginning at the orifice made by a lancet, and the fever that ensued, were ascribed to a puncture of the tendon of the biceps muscle, or of the fascia of the arm, or of a nerve; by others these symptoms were supposed to originate from a bad habit, or from the introduction of some poison adhering to the lancet; but that great benefactor to medical science and to surgery, the late John Hunter, of London, having observed a similar accident to take place after the rough operation of bleeding horses in the neck, was led to ascribe the disease in both cases to the same cause, viz. an inflammation of the internal coat of the vein; and repeated dissections of inflamed veins, in which the operation had been performed, have proved the accuracy of his opinion. By the elucidation of the disease in question, Mr. Hunter has made us acquainted with the true cause and seat of a serious disease, and increased the obligations he has laid the medical world under, by his other improvements in surgery and medicine.[55]

2. We have been indebted to the brute creation for one of the greatest temporal blessings, ever conferred upon mankind by Providence, in the discovery, that by conveying from a small pustule on a cow's udder a particle of matter, under the cuticle of a human subject, he is secured against that scourge of his existence, the small pox. If before this new source of happiness to mankind had been drawn from that animal, such an event as that just mentioned, had been declared within the compass of possibility, it would have been thought as improbable as the one I now venture to express, viz. that there is reason to believe, as in the instance

here exhibited, the possibility that an incapacity of being acted upon by the canine virus in both man and animals, may be produced by exciting in them a previous disease.

In alluding to the disease sometimes produced by the bite of a rabid animal, I am sorry, very sorry to be obliged to declare, that it still continues to humble the pride of the medical profession. We know indeed its peculiarities and symptoms, and I myself have contributed to elucidate its pathology; but we also know its extreme fatality; and with regard to the means of cure, the learned and experienced physician is brought *at once* to the level of the most uninformed among the multitude; for, gentlemen, the disease has *never* been cured, and to this day, we are obliged to remain the helpless spectators of our patient's sufferings.[56]

But we must not despair; for I cannot think that Providence has determined to permit this disease to be *forever* incurable, and can any more powerful argument be adduced for investigating the diseases of domestic animals, than the knowledge of this fact, that all of us are every day of our lives liable to the attack of an awful and incurable malady from one of them, and who is the grateful companion, and faithful midnight defender of our houses and property? On this disease I shall deliver a particular lecture; and although I will not assert that I can point out a mode of cure, yet it will still be useful to investigate its pathology, for truth is always elicited by discussion.

3. An attention to the diseases of domestic animals is moreover of infinite importance to the practitioner of medicine in another point of view: for by them we are led sometimes to anticipate fatal epidemics, and of course are provided with the means of guarding against them. Homer tells us, that the plague that spread among the troops at the siege of Troy with great fury, first made its appearance among dogs and cats. In the plague that ravaged the island of Egina, to the south of Athens, about sixty years before the Trojan war, and of which Ovid has given an affecting account,[57] the

disease also first invaded dogs, then sheep and oxen, and lastly mankind. The pestilence epidemic among the cattle, in the year 576, at Rome, was succeeded the next year by a mortal plague.[58]

Dr. Sims of London, informs us, that the scarlet fever which prevailed with very great mortality in the city of London, in the year 1798, was preceded by a remarkable epidemic among cats, which is said to have killed myriads of them. In the following year an epidemic prevailed among the horses, which appeared to be a peripneumony, attended with a discharge from the nostrils like glanders. A similar mortality among cats prevailed in the months of May and June, in 1797, in Philadelphia, and destroyed thousands of them: and we all remember the pestilential fever that prevailed during the following autumn. Fish too, often experience the effects of a pestilential atmosphere, of which the history of the epidemics in 1793, 1794, and 1797, in our own country, afforded strong proofs.[59]

In other cases, epidemic diseases, or a general unhealthiness of the air, have been preceded or accompanied by a vast increase of insects and small animals. Of this, a number of instances might be mentioned, from Lord Bacon respecting the plague in London in 1666; from Diemerbroek on the same disease in Holland in 1635 and 1636; from Baddam, on the plague of Dantzick in 1709; and from the account of the epidemic at Bengal in 1771.

During the fever at Plymouth, Massachusetts, in 1633, the woods were filled with innumerable large flies, of the size of bees,[60] and during the pestilential time in the United States, between 1792 and 1801, various other insects abounded in different parts.[61] In particular, during the year 1798, grasshoppers overspread the country; and we know that that year was very unhealthy. In the year 1805 also, the grass was destroyed by them in the low counties of New Jersey; and the same year, such was the mortality in Salem county, that I was informed the courts could not proceed in

their business, owing to the death of many jurymen by malignant fevers. The same year the yellow fever prevailed in Philadelphia. Many more facts of a similar nature might be mentioned, were it necessary.

In the prosecution of my course, it is my intention to adopt the following plan:

1. I shall demonstrate the structure of different animals.
2. Explain the use and functions of the several parts, and compare them with those of the human body.
3. Point out the causes, nature and symptoms of diseases in our domestic animals, with the method of cure.
4. Give the natural history, operations and doses of medicines.

From this plan it will be seen, that farriery, strictly so called, or what relates to the fashionable operations on a horse, makes no part of the course. By thus separating the scientific from the merely mechanical part, the veterinarian science will be at once put in a condition to go hand in hand with human medicine; but it is proper to remark, that in respect to the noble animal just mentioned, the preservation of whose health is so essentially important to us, the proper method of shoeing shall be taught, and directions given for restoring to a natural state those hoofs which have been injured by a bad system having been previously followed; with ample instructions how to preserve his health in all situations in which he may be placed.

NOTES

TO THE

INTRODUCTORY LECTURE.

Note 1.

See the Iliad, book 5, verses 65 and 304. Book 11, verse 574: other passages might be referred to.

Note 2.

Galen was a native of Pergamus in Lesser Asia; and after travelling wherever instruction was to be obtained, settled at Rome. Although a pupil of the Alexandria school, he did not blindly adopt its dogmas. On the contrary, he thought and acted for himself; as a proof of which it may be mentioned, that he disproved by a simple and obvious experiment, the opinion it had long entertained and taught, (viz. that the arteries carried air,) by laying bare a branch of one of them, in a living animal, and dividing it between two ligatures.

Note 3.

This event, it is said, took place in the year 640 of Christ, and that for six months the Turks heated their numerous baths by the MSS collections of one thousand years. The fact is not credited by M. Renaudot or Gibbon. The writer upon whose authority it is given, is Abul Pharagius, "and the solitary report of a stranger, who wrote at the end of 600 years, on the confines of Media, is overbalanced by the silence of two annalists of a more early date, both christians, both natives of Egypt, and the most ancient of whom, Eutychius, has amply described the conquest of Alexandria." Gibbon's Decline, &c. chap. 51. Eutychius lived between

the years 876 and 950. Abul Pharagius was a native of Malatia, and died in 1286, at Aleppo, primate of the East. His work (Historia Dynast.) was translated from the Arabic, by the learned Pococke, into Latin, 1659.

Note 4.

Under the auspices of Almanzur, the second caliph, and his son Abdallah, Bagdad arose and flourished in the East, (762) and at once became the residence of the successors of Mahomet, and for a long time the seat of all the learning in that quarter of the world. The exertions of the learned men of that day, however, were confined to translating ancient Greek manuscripts: they made no dissections. Nevertheless the spirit of inquiry was thus kept up, and to their translations did the western part of Europe owe their acquaintance with the learning of the ancients.

Note 5.

Andrew Vesalius was born at Brussels about the year 1512 or 1514. He was educated at Louvain, and studied anatomy at Paris, under Sylvius. In 1537 he was appointed professor at Padua, by the republic of Venice. Charles the fifth called him to be his physician, and he was also physician to Philip the second. He published his celebrated work, *de Humani Corporis fabrica*, in 1543, when only about 30 years of age: in this he detected the anatomical errors of Galen, and proved that he had taken his descriptions from brutes. This service to truth raised him numerous enemies. He is said to have been forced to fly, or to banish himself, in consequence of having opened the body of a Spanish nobleman, supposed to be dead, but whose heart he found beating. Other causes are ascribed for the act, but whatever was the motive, he set out to visit Jerusalem with Rimini, general of the Venetian army, and returning at the invitation of the senate of Venice, to fill the chair at Padua, he was shipwrecked, and died on the island of Zante, in 1564.

Fallopius was born in 1490, and was a pupil of Vesalius, and afterwards professor at Pisa, and at Padua, where he

died in 1563. His works are contained in three volumes folio. He was deemed among the first physicians and anatomists of the age, and cultivated medicine and anatomy with great zeal.

Eustachius was contemporary with the two former, and taught at Rome. He was a zealous anatomist, and the passage from the ear to the mouth is called after him, the *Eustachian tube.*

Fabricius Ab Aquapendente, (the preceptor of Dr. Harvey,) was professor at Padua, which for nearly 200 years was the most respectable medical school on the continent of Europe. His works were collected and published in Latin, at Leipsic, by professor Bohn, in one volume folio, 1687, with numerous plates. Besides much human anatomy, he has treated largely of the organs of animals.

Note 6.

Nehemiah Grew, an ingenious and learned physician, was the son of Mr. Obadiah Grew, minister in Coventry. Having been sent to a foreign university for some years, he returned, after taking the degree of doctor of physic, to London, and was admitted to fellowship in the college of physicians in 1680. He obtained extensive practice; was elected a fellow of the royal society; and on the death of Mr. Oldenburg, succeeded to the office of secretary; in consequence of which he carried on the publication of the Philosophical Transactions for a considerable time. He also drew up a catalogue of the articles in the museum of the society, which he finished in folio, under the title of Museum Regalis Societatis. To this is generally appended a work entitled the "comparative anatomy of stomachs and guts," being several lectures read before the royal society in 1676. The work however by which Grew is most deservedly celebrated, is his anatomy of plants, in which he has shown a wonderful degree of ingenuity. This work is accompanied by very numerous and well executed engravings, and may be considered as one of the most curious performances of the seventeenth century. Another very celebrated publication of this author, is the *Cosmologia Sacra,* or "a discourse of the universe, as it is the creature and kingdom of God."—This was chiefly composed to demonstrate the truth and excellence of the sacred writings. Dr. Grew died in 1711. *Trans. Royal Soc. Lond. New Abrid. vol.* 1. *page* 660.

Note 7.

Thomas Willis was born in Wiltshire, in 1621, and died in 1675. He was an excellent anatomist, as he has proved in his *Anatome Cerebri.* He also wrote *Pathologia Cerebri,* and *De Anima Brutorum.* His works were published in London, 1679, in Latin, and 1681, in English.

Note 8.

Edward Tyson was a celebrated physician and anatomist of the seventeenth century, and a great contributor to the Philosophical Transactions, especially on subjects relative to natural history and comparative anatomy. He read lectures at Gresham college. Besides his numerous communications to the royal society, he published the following works: Phocæna, or an anatomy of a porpus, 1680. Carigueya seu Marsupiale Americanum, or the anatomy of an opossum, dissected at Gresham college, 1698, (of which an account is also inserted in the Philosophical Transactions.) The anatomy of a pigmy compared with a monkey, an ape, and man, 1699. *Trans. Royal Soc. Lond. New Abrid. vol.* 2. *page* 448.

Note 9.

Samuel Collins published "a system of anatomy of the body of man, beasts, birds, insects and plants," 2 volumes folio, 1685, with numerous plates, accurately representing the parts described: there is as much comparative as human anatomy in the work.

Note 10.

Richard Lower was one of the best anatomists of the seventeenth century. He was educated at Oxford, took his degree of M. D. in that University, and exercised his pro-

fession there for some years; but at length removed to London, where he got into extensive practice. He and Dr. King appear to have been the first who performed the experiment of the transfusion of blood. Besides several papers inserted in the Philosophical Transactions, he wrote a treatise, which procured him a great and deserved renown, *de corde, item de motu et colore sanguinis et chyli in eum transitu*, 1669. Among other things in this treatise, he pointed out the difference between arterial and venous blood, proving that the florid colour of the arterial blood is derived from the air. *Trans. Royal Soc. Lond. New Abrid. vol.* 1. *p.* 197.

Note 11.

John Conrad Peyer, M. D. rendered important services to the anatomists of his day, by his work entitled "Merycologia, sive de ruminantibus et ruminatione commentarius." Bazil, 1685.

Note 12.

Regner de Graaf was born at Shoonhoven, in 1641; he studied at Leyden under de le Boe Sylvius and Van Horne; but took his doctor's degree at Angers, and practiced at Delft. He was the author of the following anatomical treatises: *De succi pancreatici natura*, 1664, and 1666; *De virorum organis generationi inservientibus*, 1668; *De mulierum organis generationi inservientibus*, 1672; *Defensio partium genitalium*, 1673. These were collected into one 8vo volume, and reprinted after his death, under the title of *Opera Omnia*, Leyden, 1677. He died prematurely when only 32 years of age, in consequence, as is supposed, of great uneasiness of mind, brought on by the warm disputes in which he was involved with Swammerdam. In his tract on the pancreatic juice, he gives an account of a very difficult anatomical experiment which he performed on a living dog, opening the abdomen, and inserting a tube into the pancreatic duct, for the purpose of collecting the juice thereof; to which he, like Sylvius, ascribed acid properties. By his other writings he threw considerable light on the structure

and uses of the different parts belonging to the organs of generation in both sexes. *Trans. Royal Soc. New Abrid. vol.* 1, *page* 241.

De Graaf also rendered essential services to anatomy, by contriving convenient instruments for injecting vessels, the idea of which had however occurred before to others, and had even been carried into effect.

Note 13.

Anthony Van Leewenhoek, so highly celebrated for his curious microscopical observations, was a Dutch gentleman, of Delft in Holland. He was born in the year 1632, and died in 1723, aged 91 years. Leewenhoek was not, properly speaking, a man of letters, but from the extraordinary assiduity with which he pursued his researches into the minuter parts of nature, and the striking novelty of the curious observations which he published, his name is perhaps more frequently quoted by philosophers and naturalists, than that of any other writer of his time. This celebrated observer had the good fortune to live at a period, when the instrument by which he obtained his fame, was yet in some degree in its infancy. He applied himself with unremitted care to the grinding and polishing into a state of perfection, the simple lens, as being the best calculated for accurate investigation; and less liable to those deceptions which a composition of glasses sometimes occasions. So many, and so extraordinary were the discoveries of Leewenhoek, that he may be said to have brought into view a new world in science; and such was the general truth and fidelity of his observations and descriptions, and the respect paid to his communications, that he has been not unaptly complimented with the title of the Delphic Oracle, and yet he was not free from errors. *Trans. Royal Soc. Lond. New Abrid. vol.* 2, *page* 66.

His works were printed in Latin at Leyden, in 1722, and afterwards in Low Dutch; and have been translated into English by Samuel Hoole, London, 1800.

Note 14.

Blazius published in 1681, a volume in quarto, on the anatomy of various animals, with plates, entitled *Anatomia Animalium figuris variis illustrata.* He had previously published a smaller one in 1673, entitled *Anatome Hominis, Brutorumque variorum,* and other works.

Note 15.

John Swammerdam. This celebrated anatomist and natural historian was born at Amsterdam in 1637. His father was an apothecary in that city, and possessed a small cabinet of natural curiosities, by the frequent survey of which his son acquired a taste for those pursuits, by which he afterwards rendered himself so conspicuous. He studied at Leyden, where he took the degree of doctor in medicine, in 1667, but never engaged in the practice of physic, devoting himself wholly to anatomical and physiological inquiries, and to collecting and examining insects. Of this class of animated beings he investigated the generation, structure, and metamorphoses, with astonishing patience and assiduity, and described and elucidated the same in his admirable work entitled, "A general history of insects," first published in the Dutch language, in 1669, and afterwards translated into English. His Historia Ephemeræ appeared in 1675. These and other observations, relative to the natural history of insects were collected into a folio volume, (Dutch and Latin,) printed at Leyden in 1737, under the title of *Biblia Naturæ, sive historia insectorum.* This edition was superintended by Boerhave, who wrote the biographical memoirs which are prefixed to it; but the Latin translation was by Gaubius, professor of pathology at Leyden. Besides a tract on respiration, Swammerdam wrote another anatomical work, entitled, *Miraculum Naturæ seu uteri mulieris fabrica,* published in 1672. He appears to have been the first who practiced the art of injecting the blood vessels with wax; for his countryman and contemporary Ruysch learned this method of him.

His collection of insects and other objects belonging to

natural history, for which the Grand Duke of Florence once offered him 12000 florins, was sold for a very inconsiderable sum. *Trans. Royal Soc. Lond. New Abrid. vol.* 1. *p.* 190.

Swammerdam first employed hot wax to inject into the blood vessels.

Note 16.

Frederick Ruysch was born at theHague in 1638, studied at Leyden, and settled at Amsterdam, on being appointed professor of anatomy there. He formed a fine collection of anatomical preparations, and curiosities in natural history, which was purchased by Peter the Great, and sent to Petersburgh. He died in 1731, aged 91 years. Ruysch excelled in the art of injecting the blood vessels, and in filling the capillary vessels. He also employed maceration and erosion. He first discovered valves in the lymphatics, and contributed largely to the progress of anatomical knowledge by his labours. His works make four volumes quarto, enriched with a great number of plates.

Note 17.

Rudbeck was born in Sweden in 1630, was professor of physic in the university of Upsal, and founder of the botanic garden there.

Note 18.

Thomas Bartholine was the son of Caspar Bartholine, (a man of universal erudition,) he was at first made professor of mathematics, at Copenhagen, but afterwards filled the anatomical and medical chair in that university. In this situation he discovered the lymphatic vessels. He also traced the course of the thoracic duct in the human subject, confirming and elucidating Pecquet's description thereof. His anatomical and medical writings are very numerous. This celebrated man died in 1680, aged 64 years. *Philos. Trans. abridged, vol.* 1, *p.* 247.

Note 19.

Marcellus Malphigi was born in the year 1628, near Bologna, where he studied and graduated, M. D. in 1653. He

was elected to the professorship of the theory of medicine in that university, in 1656, but soon afterwards accepted of a similar appointment at Pisa, which situation he resigned at the end of three years, as the air of that place was prejudicial to his health. In 1662, he succeeded Castelli in the professorship of physic at Messina, where he remained four years, and then returned again to Bologna. Here he continued as a teacher of medicine in the highest repute, from 1666 to 1691, when he was invited to Rome, and appointed chief physician to Pope Innocent XII. He died at Rome of an apoplexy, in 1694. Malphigi's labours have thrown great light upon the structure and physiology of the human, brute, and vegetable creation; as may be seen by consulting his *Anatome Plantarum, Epistolæ Anatomicæ, Exercitationes Anatomicæ, Dissertationes de Utero, de Formatione pulli in ovo, de bombyce, &c.* These tracts were collected into two folio volumes, printed in London in 1686, under the title of *Malphigii opera Physica et Medica.* And in 1697 a third folio volume appeared, containing his *Opera Posthuma.* In his anatomical investigations he resorted to what in those days were new methods; viz. to maceration of the parts, injection of the vessels with coloured liquors, and the employment of magnifying glasses. By such means he was very successful in developing the intricate structure of some of the viscera in man and quadrupeds, as well as the minute fabric of insects and vegetables. He appears to have been the first who used the microscope for examining the circulation of the blood. *Trans. Royal Soc. Lond. New Ab. vol. 1, p. 190.*

Francis Redi was born at Arezzo, in 1626; studied physic at Pisa; was appointed physician to Ferdinand II, and afterwards to Cosmo III, for with the family of the Medici, literary and scientific merit led to preferment, and was sure of receiving its due tribute and reward. After his death, in 1698, Cosmo caused a medal to be struck to perpetuate his name. His letters (2 vols. 8vo) contain a variety of medical cases and remarks, with observations on anatomy, natural history, and experimental philosophy. His style is regarded by his countrymen as highly classical. His works amount to 7 volumes 4to. Hutchinson, vol. 1, p. 429.

Note 20.

Casserius wrote *De voce auditusque organis historia anatomica.* Paris, 1600, folio, with plates and cuts.

Note 21.

The title of one of Perrault's works is *OEuvres diverses de Phisique et de Mechanique, par Mess. C. & P. Perrault,* (a work of the latter, on fountains, having been published with those of his brother Claude,) Leyden, 1622, 2 vols. 4to.

Claude Perrault also wrote *Mémoires pour servir à l'histoire naturelle des animaux,* 1676, folio. He was an excellent architect, and designed the superb entrance of the Louvre. He died in 1687, aged 75. His life may be seen in Hutchinson's *Biographia Medica,* London, 1799.

G. J. Duverney, professor of anatomy, Paris. Haller says of him, "per sexaginta annos innumerabilia corpora incidit, et a praxi etiam medica abstinuit, ut inter mortuos viveret: multorum certe inventorum auctor, que aliis nominibus tribuuntur." Bibl. Anat. tom. 1, p. 626. Duverney was the human and comparative anatomical pioneer of the latter part of the 17th, and beginning of the 18th centuries.

Note 22.

D'Aubenton gave the anatomy of most of the animals, whose natural history was described by Buffon. Two editions were originally published of Buffon's work; one in 4to. and another in 12mo.—But later French and English editions have omitted the anatomical parts.

Note 23.

Vic D'Azyr, the son-in-law of D'Aubenton, was a very able human and comparative anatomist; he compiled the excellent system of comparative anatomy inserted in the *Nouvelle Encyclopedie Methodique* in which the anatomy of each animal is given separately; and published many papers

on the subject in the Memoirs of the French Academy. The anatomy of each animal is given separately, whereas Cuvier and Blumenbach treat the subject according to the organs and functions of the body.

Note 24.

An excellent account of Camper may be found in the New Edinburgh Encyclopædia, published by Edward Parker, Philadelphia.

Note 25.

Cuvier's work is entitled Leçons D'Anatomie Comparée; in 5 vols. 8vo. and a 6th of plates, Paris, 1805. The two first vols. have been translated in London by Mr. Ross under the direction of Mr. M'Cartney, lecturer on comparative anatomy. A larger work by Cuvier is shortly expected on the same subject.

Note 26.

Blumenbach's work is in one vol. 8vo. and forms an excellent compend of the science. It is well translated by Mr. Lawrence of London. The transactions of the royal society of London contain a great number of papers on comparative anatomy by various persons: a list of which is given in Dr. Thompson's excellent and entertaining "*History of the Royal Society from its institution to the end of the 18th century, London, 1812,*" p. 112. The subjects being scientifically classed, by Dr. Thompson, a reference to it will save much unnecessary labour in searching the voluminous work of the society for a paper on comparative anatomy, or any other subject that he may wish to investigate. See also the article "Comparative Anatomy" in the Philadelphia edition of the New Edinburgh Encyclopædia for a list of authors and papers on our subject.

Note 27.

The title of Herder's profound work is "Outlines of the philosophy of the history of man, by John Godfrey Herder." An English translation was published by T. Churchill, London, 1800, 4to.

Note 28.

Anatomists might have reasonably concluded that Galen's anatomical descriptions had been taken from brutes; because, although he says, he had dissected many of the latter, yet he makes no mention of having examined human bodies: we know also that he expressly advises physicians to practice the dissections of apes and monkeys, and not to lose the opportunity of dissecting human subjects if by chance, the German war, or any other accident, they should find one; and had Galen ever dissected a human body, his vanity which is so conspicuous in his writings would not have permitted him to conceal the fact. Vesalius first discovered that Galen's description of the human body was formed from the dissection of brutes, by comparing his descriptions with the actual structure of the parts as laid open by the knife, and for this service to medicine and to truth he excited the enmity of all the medical professors, who had been promulgating Galen's mistatements, as truths.

Notes 29, 30.

Trans. Royal Soc. London, 1797.

Note 31.

Harvey's account of his discovery is entitled "*Exercitatio Anatomica de Cordis et sanguinis motu.*" It is an extraordinary circumstance that the circulation of the blood through the body, should not have been discovered before the time of Harvey, considering that the fact (although not founded on experiment) is plainly asserted by Plato, whose writings had been so long familiar to the learned world. "The heart, says he, is the centre or knot of the blood vessels: the spring or fountain of the blood which is carried impetuously round: the blood is the pabulum, or food of the flesh: and for the purpose of nourishment, the body is laid out into canals, like those which are drawn through gardens, that the blood may be conveyed, as from a fountain to every part of the pervious body."

Hippocrates also speaks of the "vessels communicating with each other, and of the blood undergoing a kind of flux and reflux from and to the heart like the ebbing and flowing of the sea," and even mentions the throbbing of the temporal arteries, as an evidence of the fact. Galen also had (as I have before said,) showed that the arteries contained blood as well as the veins, by the simple experiment of dividing a branch between two ligatures in a living subject, and thus disproved the opinion of the Alexandria school, that they merely contained air. The lesser circulation, or that through the lungs, had been ascertained by Servetus a Spanish physician, and by Columbus the pupil of Vesalius, and was known to other eminent men; and Cœsalpinus an Italian even mentions the communication between the arteries and veins at their extremities, and speaks of the valves of the arteries and auricles as capable of preventing the return of the blood, but still it is apparent from other parts of his writings that he had no consistent idea of their use or of the circulation. Further, the early discovery of the valves of the heart, and those placed at the mouths of the large arteries which had been made by Erasistratus; of those in the veins of the extremities by Sylvius, as mentioned by Stephanus, and the discovery of similar valves in the veins of the arm by Fabricius of Padua, the preceptor of Harvey, it would seem might at once have led to the belief of the existence of a similar organization in the veins of other parts of the body, and to a knowledge of their use in preventing the return of the blood, to the extremities, and to the deduction of its having been previously carried from the heart by the arteries. It was this organization of the veins that furnished Harvey with one of the strongest arguments in favour of his sublime discovery. Finally, says Dr. Hunter, "the obvious phænomena in bleeding animals to death, the different effects of ligatures on different vessels, the practice of surgery with regard to bleeding and blood vessels, the action of the heart when exposed to view in living bodies, all these so evidently proclaim

the circulation, that there seems to have been nothing more required for making the discovery than laying aside gross prejudices, and considering fairly some obvious truths."* Yet anatomists continued until the time of Harvey to assert that the liver was the source of blood, and that from it, the vital fluid was distributed to other parts of the body.

For an account of the opposition made to Dr. Harvey by the envious part of his contemporaries, and of the injurious effects which this sublime discovery had upon the temporal prosperity of its author, the reader is referred to Dr. Rush's volume of Introductory Lectures, a work which ought to be in the possession of every gentleman, and of every professor of divinity, medicine or law.—The life of Harvey may be found in Hutchinson's Biographia Medica.

Note 32.

See Cruikshank's anatomy of the absorbent vessels, p. 30, London, 1790. The history of the absorbents is curious and extremely interesting.—Erasistratus the grand son of Aristotle had certainly discovered these vessels in the intestines of a kid, but he thought they were arteries and agreeably to the opinion of the Alexandrian school of which he was a pupil, he supposed they contained air like other vessels of the same nature. These vessels are also hinted at by Hippocrates, and Galen, but their real use was ascertained by Azellius of Cremona in 1622, who in dissecting first a dog, and afterwards other quadrupeds, observed vessels containing a milky fluid to commence from the intestines; but though he traced them to a cluster of glands which he called pancreas, yet because he also found a few similar vessels on the liver he supposed that viscus to be their final place of termination. The result of the labour of Azellius was published with coloured plates in 1627, after the death of the author, and the year before Harvey's work on the circulation came

* Introductory Lecture, p. 43.

out: for many years both these works excited great interest and the anatomists of all Europe were zealous in verifying their discoveries, and in testing their remarks by the dissection of living animals. At length Pecquet of Paris saw the chyle actually flowing into the heart of a living dog in a regular stream, and traced the source of this fluid to the common receptacle of the thoracic duct. He published his account in 1651: Eustachius before had seen this duct, but did not know the real use of it: he called it *vena sine pari*. Van Horne a Dutch professor laid claim to the merit of the same discovery the following year. Eustachius had a century before discovered the same vessels in a horse, but he was ignorant of their use in the economy of the animal, or of their origin. The honour of ascertaining both points was reserved for Pecquet. The discovery of another set of absorbents, which arise from all the cavities of animal bodies soon followed by the dissection of dogs, viz. in 1651 or 1652. These were called lymphatics from the pellucid nature of their contents, and were found to end with the lacteals in the thoracic trunk. In later times, the same system of vessels was found by various anatomists in all other animals that were examined, of both land and water, and in the human brain by Mascagni of Italy, from whose dissections a series of the most elegant plates have been published. The merit of discovery of the lymphatics in other parts of the body, besides the intestines, was due to Bartholine and Rudbeck, who were contemporaries in the 17th century. The priority of time however by a few months seems to belong to Rudbeck, although Bartholine first published his account of the lymphatics.

Note 33.

Dr. Edward Stevens of St. Croix: his experiments are contained in his inaugural dissertation on digestion, Edinburgh, 1777: a very good abstract of them may be found in Smellie's philosophy of natural history. Dr. Stevens made some of his experiments upon an Hungarian.

Note 34.

New Edinburgh Encyclopædia, article comparative anatomy. In this way the vermicular and peristaltic motion of the bowels—the respiration of birds, and the action of their gizzards, &c. &c. were ascertained.

Note 35.

The spleen has been extracted from dogs and other animals without any injury, and even from man: as Haller shows by numerous authorities: Phys. tom. 6, p. 421, 4to, Lugdun. Batav. 1764. Mr. Shipton cut out two fingers length of the ilium of a dog, without injury to him. Phil. Trans. No. 283. Dr. Musgrave cut out the cæcum of a bitch, without any injury. Phil. Trans. No. 151. The late Dr. Jones of Philadelphia cut off a portion of the pancreas of a man, that protruded from a wound, and he did well.

Note 36.

One dog lived "for more than twelve months, with the two carotids, the two femorals, and one brachial artery obliterated." The vessels were tied in succession, after the wounds of a previous operation had healed. The dog whose aorta was tied, lived two years, and was then killed; and the body being injected, the anastomosing vessels were beautifully seen. Med. and Chirurg. Trans. London, vol. 2.

Note 37.

The saving of life by taking up the vessels of the neck, or the large vessels of the extremities, when they are diseased or wounded, is a modern improvement in surgery. In former times, death in the one case, and the loss of the limb in the other, was the fate of the sufferer.

Mr. John Bell of Edinburgh, took up the posterior iliac artery, in consequence of its division, by the points of a long pair of scissars, "at the place over the sciatic notch, where it comes out from the pelvis;" it was tied exactly where it turns over the bone, and the man was cured, "and walked stoutly." Surgery, 4to, vol. 1, p. 423.

Mr. Abernethy of London, first tied the external iliac artery above Poupart's ligament, which operation he performed in a case of femoral aneurism. His first and second attempts were unsuccessful, owing to the desperate nature of one case, and an unusual occurrence in the other. Mr. A. afterwards was happy in saving two lives by it.* Mr. Freer and Mr. Tomlinson of Birmingham, performed the same operation with success, each once.† Dr. Dorsey also performed it in the Pennsylvania Hospital, in 1811, successfully.‡ The patient walked on the twentieth day. Mr. Astley Cooper of London, has also tied the carotid artery for aneurism, in two cases, the first, in 1805, was in the right carotid; death took place from "an inflammation of the aneurismal sac and parts adjacent, by which the size of the tumour became increased so as to press on the pharynx, and prevent deglutition, and upon the larynx, so as to excite violent fits of coughing, and ultimately impede respiration." In the second case, in 1808, the disease was in the internal carotid, and was cured. See Medico-Chirurgical Trans. vol. 1, pages 1 and 222. London, 1809. Dr. Post of New York, has also within the last year successfully operated in New York for aneurism in the carotid artery.‡ See also Mr. Cooper's account of the dissection of a limb, in which the operation for poplitial aneurism had been performed, in the Medico-Chirurgical Transactions, vol. 2, London, 1812.

Note 38.

Professor Camper rendered most important services both to human and comparative anatomy. His account of the dissection of apes, monkeys and ourans outang is inserted in the Trans. Royal Soc. London, for 1779—vol. 69, and is entitled

* Surgical observations on the constitutional origin and treatment of local diseases, and on Aneurisms. London, 1809.

† Freer on Aneurism. Birmingham, 1807, 4to.

‡ Dorsey's Surgery, vol. 2.

"*On the organs of speech of the ouran outang.*" But as these animals cannot speak, the expression should have been *voice* and not "speech."—Dr. Tyson of London who was himself an accurate dissector, had published in 1699 "ourang outang, or the anatomy of a pigmy compared with a monkey, an ape and man," 4to. without discovering the difference between their organs of speech and voice. Albinus, Martini and even D'Aubenton are also silent on the striking construction of this organ in apes. The merit of professor Camper was therefore the greater, for it unravelled the mystery of their incapacity of speaking, although possessed of organs, (as was supposed) equally well adapted to the end, as those of man. Mr. White confirms professor Camper's statement, and exhibited a preparation of the membranous bag of the monkey to the Manchester Society. Account of the regular gradation of man, by C. White, p. 27—London 1799. There can be no doubt of the confirmation, nor any difficulty in accounting from it, for the want of speech in ourans, apes, &c. Lord Montboddo labours hard to prove, with Rousseau, the humanity of the ouran outang, and accounts for the difference between the result of Tyson's and Camper's dissections of ourans, by the circumstance of the first having examined one from Angola, and the other those from Borneo. See Origin and Progress of Language, vol. 1. p. 344: and Ancient Metaphysics, vol. 3. p. 44. No anatomist or natural historian who grounds his distinctions of animals upon anatomy will attend to this argument.

Note 39.

D'Aubenton, by the dissection of a camel for Buffon's natural history, had many years since actually found a considerable quantity of water in the cells of the stomach, though the animal had been dead ten days. The water was clear, almost insipid, and drinkable. He therefore assents to the assertion of travellers, that camels are killed for the water in their stomachs. Perrault, who dissected a camel in 1676, Mem. de l'Acad. de Scien. tom. 3, was of the same opinion,

but Mr. Home has put the question beyond all doubt, by the dissection of a camel in London, in the year 1806; an account of which may be found in the Trans. of the royal society Lond. for that year. He fully and very clearly explains, from the structure of the camel's stomach, how that animal is enabled to take in a supply of water for future use, thus fitting him to live in sandy deserts, where supplies of water are precarious or scanty.

Dr. Russel says he knew an instance of a camel in a Bassora caravan, remaining fifteen days without water; but none of the natives recollected a similar instance. Leo Africanus however mentions one. Descript. Africæ, lib 9, p. 281. Dr. Russel says that camels sometimes show a preference for salt water, Nat. History of Aleppo, vol 2, p. 167, 168, London, 1794, 4to.

Note 40.

Chemistry also has recently lent its aid to disprove a popular error, which has long prevailed respecting the origin of the salt familiar to most persons by the name of sal ammoniac, which was first brought to Europe from Egypt, and was said in early times to be formed by the action of the camel's urine upon the sands of the desert, near the temple of Jupiter Ammon. Lemery and Pomet both give assent to this notion, and the latter, in his history of drugs, gives a plate of a camel in the act of discharging his urine, and the mass of salt forming in consequence of it under his body!* But the recent analysis of the urine of the camel, shows that ammonia exists in it in so small a proportion, as to render it impossible to suppose it could have the least agency in the formation of the salt in question.

The analysis of the urine of camels referred to, was made by two good chemists, in different countries, viz. Messrs.

* Pomet on Drugs, page 250. London, 1737. The work was originally published in French, in 1694. Lemery derives ammonia from αμμος, (ammos) arena, sand.

Rouelle in France and Mr. Brande in London, and their agreement in the general result, leaves no doubt as to the accuracy of it.

Analysis of the camel's urine, as given by Mr. Home.

BRANDE.		ROUELLE.*
Water, - - -	75	Carbonat of Potash,
Phosphat of Lime,		Sulphat of Potash,
Muriat of Ammonia,		Muriat of Potash,
Sulphat of Potash,	6	Urea.
Urat of Potash,		
Carbonat of Potash,		
Muriat of Potash, - -	8	* Thompson's Chemistry, second Edition, vol. 4, page 655.
Urea, - - - - -	6	
	95	

The urine of cows was also analyzed by both Mess. Brande and Rouelle, both of whom agree in stating that potash is the only fixed alkali in them.

We now know that the salt which the ancients called *sal ammoniac*, was common salt: and that the true sal ammoniac is not found native. The Egyptians are stated to have procured it by sublimation from soot of cow's or camel's manure, urine and common salt: but from accounts transmitted to the royal society at Paris, it appears certainly that this salt is procured by sublimation from the soot taken alone without any addition. Nicholson's Chemical Dictionary, vol. 1, p. 116; and Magellan's edition of Cronstadt's Mineralogy, p. 458. The soot taken from the chimneys in which cow dung only, as fuel, is burnt, is said to furnish the best sal ammoniac. This salt is however commonly prepared from burnt bones, in the United States, and in Europe.

From Vauquelin's analysis of the urine of various animals, (Annales de Chimie, tom. 82, p. 197,) it appears that the urines of the lion and the tiger are perfectly similar, and differ from the human in some essential points.

1. It is alkaline, even at the instant of being voided, and hence its bad odour; while the urine of a healthy man is always acid.

2. They do not contain any uric acid, nor any combination of this acid with the alkalis. The defect of uric acid in those urines, struck Mr. Vauquelin more forcibly, as he used to ascribe its formation to animal food.

3. They contain only a very small quantity of muriate of soda, (sea salt,) whereas that of man contains a great deal. We find in these urines, much urea, phosphates of soda and of ammonia, sulphate of potash, mucous matter, and a trace of iron. The urine of the beaver has a great resemblance to the urine of herbiverous animals; that of a rabbit, contains lime, magnesia, and carbonate of potash, sulphates of potash and of lime, muriate of potash, urea, gelatine, and sulphur. He did not find any soda in the urines of the camel, cow, Guinea pig, or rabbit. The urine of the horse, according to Fourcroy and Vauquelin, (Thompson's Chemistry, vol. 4,) contains carbonates of lime and of soda, much benzoat of soda, muriate of potash, and urea. Mr. Brande's analysis of the horse's urine, agrees with that of Messrs. Fourcroy and Vauquelin, but he also found in it sulphate of soda, muriate of soda, but no urea, potash or ammonia. Mr. Brande found that the urine of the ass contains a much greater relative proportion of the phosphat of lime and urea, also carbonate, sulphate, and muriate of soda, and a small quantity of potash. The urine of both the horse and ass is destitute of ammonia.

The foregoing details of the urine of various animals are given, as being connected with the interests of agriculture; urine having been found to be highly stimulant to vegetables: and from the abundance of certain ingredients in that of a particular animal, and their deficiency in others, we may ascertain why certain urines are prejudicial, or useful to particular plants.

Note 41.

The notion of the submersion of swallows during winter is of Swedish origin. Olaus, the bishop of Upsal first promulgated it, and naturalists more worthy of attention assented

to it. Linnæus confined submersion to chimney swallows and martins. Kalm his pupil believes the story, and begins the discussion of the subject by saying that "natural history like all other histories depends not always upon the intrinsic degree of probability, but upon facts founded on the testimony of people of noted veracity."* But this testimony must not violate probability, nor be inconsistent with one of the first rules of philosophising, viz. that "like causes produce like effects;" now, if we find that the lungs of two animals are constructed precisely alike, and that one of them cannot live under water, we must conclude that the other is also deficient in that same power. This is the case with man and swallows: both are formed alike, and hence they must be subject to the same laws. Those who wish to see more on this question are refered to a paper I published (anonymously) in the Med. Repository of N. York, vol. 3, p. 241.—1800. Barton's Fragments, Philad. 1799, Caldwell's Memoirs, 1801, and to "Observations on the brumal retreat of the swallows," by Thomas Foster, F. Lin. Soc. London, 1813. The arguments of this author in favour of the swallow being a bird of passage are indisputable: he has also annexed an index to passages relating to the swallow in the works of the antients, and in modern European authors, which is curious and highly interesting.

Note 42.

Adrian Vandervelde was born in 1639 at Amsterdam, and was a pupil of John Wynants. He died at the age of 33. See further, Pilkington's dictionary of painters, p. 686, 4to. London, 1798, and Camper on the connexion between anatomy and drawing, &c. translated from the Dutch by Dr. Cogan, London, 1794.

Note 43.

Aristotle long since remarked that the motion or steps of animals in general are made in the line of their diagonal:

* Travels, vol. 2, p. 140.

that is, in the direction of their two opposite quarters. The absurdity of the error noticed is evident. But the camel forms a striking exception to the rule: he walks by raising the two legs of the same side, the one immediately after the other. Aristotel. de hist. animal. lib. 11, cap. 1. Dr. Russel confirms Aristotle's statement. Nat. Hist. of Aleppo, vol. 2, p. 169, & p. 423. The engravings of the skeletons of some of the animals in Buffon's natural history, particularly of the horse, are very inaccurate.

Artists should read the following works besides Camper's.

1. Reflections on the painting and sculpture of the Greeks, with instructions for the connoiseur, and an essay on grace in works of art, translated from the German original of the Abbe Winkleman, by Henry Fusseli, London, 1765—8vo.

2. Count Algarotti on painting, London, 1763—12mo.

3. Dr. Brisbane on the anatomy of painting, with 6 plates, London, 1769.

4. Essays on the anatomy of expression in painting, with plates, by Charles Bell, 4to, London, 1804. This last is by one of the first anatomists of the present day, and ought to be studied by every painter or engraver, of either man or animals.

Note 44.

Gentleman's Magazine, 1790, p. 299.

Note 45.

See an account of a case of croup in a calf, in memoirs of the Philadelphia society for promoting agriculture, vol. 3, by Mr. Peters, president of the society.

Note 46.

Memoirs medical society, London, vol. 5.

Note 47.

This disease has prevailed with great mortality in Philadelphia county during the last spring. Mr. G. Montague gives some reasons, for believing that by mixing the food of fowls with urine instead of water, and feeding them with it three or four times a day, it may be removed. Memoirs of

Wernerian Nat. Hist. Soc. Edinburgh, vol. 1. 1811. Mr. Peters informs me that he cures it by small pills of camphor, given twice a day.

Notes 48, 49.

Gentleman's Magazine, 1790, page 497.

Note 50.

Mr. Lawrence, "Philosophical and practical treatise on horses," has justly ridiculed, and with much pleasantry, the absurd farrago of nostrums administered by farriers.

Note 51.

I was told by an intelligent drover, that it is the cattle from the district of the long-leaved pine, that possess the power of diseasing other cattle. This species is the *Pinus Australis* of Michaux, *Pinus Palustris* of Linnæus, the pitch pine, yellow pine, red pine, or broom pine. According to Michaux, the country occupied by this pine commences near Norfolk, and continues in a south west direction for 250 leagues in length, and 40 to 50 in breadth. See *Histoire des Arbres Forestiers de L'Amer. Septent. Paris,* 1810. I would be very thankful for any information on the subject of the disease in question. We see something similar to the disease produced among northern cattle, by mixing with those from the south, in the human race. During the revolution war in the United States, the mixture of southern with northern troops, speedily induced disease, if encamped together, although both had been previously healthy. See Rush's Works, vol. 1. In like manner, the mixture of the crews of ships of different nations, at sea, has often produced disease. See Blane's diseases of seamen, page 235; and the arrival of a stranger at St. Kilda, one of the remote and small western islands of Scotland, produces a catarrh among the inhabitants.—Martin's History of the Western Islands, page 284. The case of the South Carolina cattle is however peculiar. We do not find that those from other states produce a similar complaint, or any other, when mixed with the stock of Pennsylvania. The fatal disease alluded to, that

occurred in 1796, in one instance, at Columbia, on the Susquehannah, attacked stock which had merely strolled about, or had lain down in a ploughed field, in which the South Carolina cattle had been previously penned for one night; a full proof of the virulence of the effluvia left by them on the ground. The precaution suggested by the foregoing facts, in grazing, and in armies and navies, is obvious.

Note 52.

See Memoirs of the Philadelphia Society for promoting Agriculture, vol. 1, pages 139, 154.

Note 53.

See account of this disease, by the Rev. Mr. Parsons, in the New York Medical Repository, vol. 1.

Note 54.

See Archives of useful knowledge, vol. 1, page 398, and vol. 2, page 400.

Note 55.

For Mr. Hunter's account of the inflammation of a vein from bleeding, (which is highly interesting,) see Transactions of a society for the improvement of medical and chirurgical knowledge, London, 1793, page 18. Also, Dorsey's Surgery, vol. 1. The late Mr. Wignell, of the Philadelphia Theatre, died of this disease.

Inflammation in the veins of horses or man, after bleeding, according to Hunter, arises from not fully closing the external wound, "and when inflammation takes place beyond the orifice, the surgeon should immediately put a compress upon the vein, at the inflamed part, to make the two sides adhere together: or if they do not adhere, yet simple contact will be sufficient to prevent suppuration in this part: or if inflammation has gone so far as to make the surgeon suspect that suppuration has taken place, then the compress must be put upon that part of the vein just above the suppuration. This I once practiced, and as I suppose, with success." If the disease proceeds, bleeding and other depleting remedies are to be used. Dr. Physick has applied

a blister over the part with success. Dorsey's Surgery vol. 1.

"Upon tracing the vessels, after death, from the inflamed part," Mr. Hunter says, "pus is found mixed with the blood. In some places the sides of the vein were adhering, and in others the inner surface of the vein was furred over with coagulable lymph."

Note 56.

The cases of the cure of the disease produced by the bite of a mad dog, in Calcutta, which have been recently published by Mr. Tymon, Dr. Shoolbred, and Dr. Berry, ought possibly to be adduced as exceptions to the general position; but we must have more cures by the same remedy, before it can be said to be safe. *It never has succeeded before in any country.* See Medical Repository, vol. 2, New Series, and Eclectic Repertory, Philadelphia, vol. 3, for the cases alluded to.

Note 57.

Metam. lib. 7. v. 523.

Note 58.

Livy, lib. 41.

Note 59.

Mem. Med. Soc. London, vol. 5, and Webster's history of epidemic and pestilential diseases, vol. 1, pages 139 and 321. Hartford, 1799.

Notes 60, 61.

Webster, vol. 1, pages 86, 181, and other places. Mr. Webster has rendered an essential benefit to medicine, by his great collection of facts on the subject of epidemic diseases, and by showing their connexion with, and occasional dependence on natural phænomena.

LIBRARY.

The following books have been added to the library since the publication of the first volume.

FOLIO.

The Farmer's Account Book of expenditure and produce for each day, month, and year, by D. Young, Edinburgh. Gift of James Ronaldson.

QUARTO.

Rules of the West Lothian Farmer's Club. Gift of James Ronaldson.

A Volume of memoirs and pamphlets on agriculture, botany, and rural economy, by M. Thouin, professor of agriculture, Paris, 333 pages. Paris.

Communications to the Board of Agriculture of England, vol. 5.

Michaux on the forest trees of the United States, with elegant coloured plates, 10 Numbers. 24 complete the work.

Transactions of the society for promoting agriculture in Connecticut. New Haven, 1802. Gift of Samuel Hazard.

Proposals for establishing an institution, called "the plough or joint stock farming society," by Sir John Sinclair. Gift of James Mease.

OCTAVO.

General View of the agriculture of the North Riding of Yorkshire, by John Tuke. London, 1800.

General View of the agriculture of the West riding of Yorkshire, by Robert Brown, London, 1799.

Monthly Register, and Encyclopædian Magazine, 5 vols. London, 1802—3.

Commercial and Agricultural Magazine, by Dr. Dickson, vol. 1, 2, 3.

Letters and papers of the Bath society, vols. 10, 11. Gift of the society.

Agricultural Mechanism, or a display of the properties of vehicles and implements of husbandry, with 20 copper-plates, by Captain Thomas Williamson, London, 1810.

Veterinary Physiology and Pathology, by James Clark, Edinburgh, 1806.

The Husbandry of three British farmers, Bakewell, Arbuthnot, and Ducket, by A. Young, London, 1811. Gift of Mr. Peters.

Sir John Sinclair's account of the system of husbandry adopted in the more improved districts of Scotland, London, 1812. Gift of Robert Barclay, Esq. of London.

The following five works were presented by Mr. Samuel Patterson, of Edinburgh.

Hogg, on Sheep, Edinburgh, 1807.

Memoirs of the Caledonian Horticultural Society, No. 1 and 2, Edinburgh, 1812.

Sir John Sinclair's account of the system of husbandry adopted in the more improved districts of Scotland, Lond. 1812.

Repertory of Arts, London, first 5 vols.

Farmer's Magazine, Edinburgh, vols. 8, 9, 10, 11, 12, and No. 49 and 50.

Memoirs of the Agricultural society of the department of the Seine, 9 vols. Paris. Gift of the society.

On the cultivation of the horse-chesnut tree, by A Baumé, Paris, 1798. Gift of N. G. Dufief.

The following are the gift of James Mease.

Two Letters to Sir J. Sinclair, on draining wet lands, by Dr. Anderson, Edinburgh, 1796.

Constitution of the Merino Society of the middle states of North America, Philadelphia, 1811.

On the Pine lands of Georgia, by George Sibbald, Augusta, Georgia, 1801.

Observations on the agriculture of the United States, by Mr. Strickland, London, 1801.

On the agriculture, manufactures and commerce of the United States, New York, 1789.

Essay on the mending the breed of horses in America.

Bartley's observations on the conversion of pasture land into tillage, and on using potatoes in manufacturing starch and feeding sheep, Bath, 1802.

On Fiorin grass, by Dr. Richardson, London, 1810.

Report of the committee of the Highland society of Scotland on Shetland wool, with an appendix by Sir John Sinclair and Dr. Anderson, on the same subject. Edinburgh, 1790.

DUODECIMO.

The following pamphlets, in French, are the gift of the author, M. De Cubieres, of Versailles.

1. Memoir on the ash-leaved maple *(acer negundo)* of the United States, Versailles, 1804.
2. On the red cedar *(Juniperus Virginiana)* of the United States, Versailles, 1805.
3. On the nettle tree, *(Celtis.)* 1808.
4. On the Magnolia Auriculata.
5. On the Cypress, *(Cupressus Distioha.)*
6. On a remarkable marble, called Magnesian Greek, *(Grec Magnesien.)*
7. Discourse on the advantages rendered to agriculture by women.

Memoir on the utility of hedges, by M. Bosc, Paris, 1807.

Exposition of the plan of operation adopted at the various nurseries for vines, at Luxembourgh, by M. Bosc. These two last presented by Mr. Michaux. (French.)

Summary view of the courses of crops in England and Maryland, by J. B. Bordley, Philad. 1784. Gift of the author.

Rules, orders and premiums of the Bath Society, for 1809. Gift of Dr. Parke.

Ditto for 1812 and 1813. Gift of James Mease.

The following are in French.

Elements of the veterinary art. On the Materia Medica, by C. Bourgelat, 2 vols. 8vo. 4th edition, Paris, 1805.

Treatise on sheep, by M. Chambon, 2 vols. 8vo. Paris, 1810.

Treatise on the exterior of the horse, by C. Bourgelat, 6th edition, with notes by J. Huzard, and plates, 8vo. Paris, 1808.

Instructions on sheep, and particularly Merinos, by M. Tessier, Paris, 1810.

Treatise on building, en Pisé, by Francois Cointeraux, Paris, 1790. Gift of M. De Lormerie.

Memoir on a cabbage that can be mowed. Chou à faucher, by the Abbe Commerel, Paris, 1789. Gift of ditto.

On the culture of rice in France, by M. Lasteyrie. Gift of the author.

Report to the Agricultural Society, Paris, on M. Michaux's voyages to the United States, Paris, 1809. Gift of Mr. Michaux.

List of the members of the Agricultural Society of the department of the Seine, for 1809. Gift of the Society.

The following French pamphlets are the gift of J. Mease.

Memoir on furze, whin, or gorze—L'ajonc, (Ulex Europeus, Lin.) by M. Colvel, Paris, 1809.

Treatise on the management of forests and woods, by M. Dralet, Paris, 1807.

Memoir on a disease that affected the milk cows of Paris and its vicinity, Paris, year 8th.

On sheep, by the Marquis de G***, Paris, 1788.

On Merino sheep, by F. H. Gilbert, Paris, year 7th.

Report to the Agricultural Society, Paris, on the improvement of agriculture in the department of the High Alps, (des Hautes-Alpes,) by M. Pettit, Paris, 1810.

On the farming of Baron Flotbeck, and on the cultivation of Chicory, at Brunswick, (Germany,) by M. Brunn-Neergard, Paris, 1808.

Manual of practical agriculture, by the Senator, M. the Count de Pere.

Some facts on Merinos, by C. Pictet.

The following are the gift of John Vaughan.

Observations on the sowing of spring wheat, published by order of the Dublin society, Dublin, 1807.

Essay on the construction of ice houses, and a description of a refrigerator, (for the preservation of butter or meat,) by Thomas Moore, Baltimore, 1804.

The great error of American agriculture exposed, and hints for improvement suggested, by Thomas Moore, Baltimore, 1801.

Treatise on practical farming, and on the use of plaster of Paris, deep ploughing, &c. &c. by John Binns, of Loudon county, Virginia. Frederick Town, Maryland, 1803.

Virgil's Pastorals and Georgics, translated into English prose, with notes and reflections, by James Hamilton, Edin. 1742. Gift of Mr. Samuel Patterson, Edinburgh.

Papers published by the Massachusetts society for promoting agriculture, 2 numbers, 1796, 1804. Gift of F. Nichols.

Bakewell on Wool. Gift of Solomon W. Conrad.

An Essay on the utility of soap ashes as a manure, London, 1812. Gift of James Mease.

The Society are collecting specimens of native manures: and also working models of useful agricultural implements as far as their *limited funds* will permit. They will cheerfully receive models of all improved or patented implements, from the proprietors.

BIOGRAPHICAL SKETCH

OF

GEORGE CLYMER,

LATE VICE-PRESIDENT OF

THE PHILADELPHIA SOCIETY FOR PROMOTING AGRICULTURE.

As a tribute to the memory of our departed vice-president, we have prefixed to our volume, a portrait of the late most worthy and painfully lamented,

GEORGE CLYMER.

He was born in 1738, in the city of Philadelphia. He died February 19th, 1813—Aged 75.

His education was liberal, and his time and studies were always directed to useful pursuits. In the earliest stages of our late revolution, he was the exemplary and steady friend to its principles. To those he not only devoted his time and talents, but also no small portion of his property.

He was a captain of a company, among the earliest associators, who took up arms in support of the liberties of our country, when we were under the necessity of resorting to force for their defence.

Through the arduous contest for our independence, he uniformly enjoyed the confidence of his fellow citizens; and served in various public stations, with integrity and ability; executing in seasons of great difficulty and danger, the most important public trusts.

He was a member, for the state of Pennsylvania, of the venerated congress of 1776: and one of those eminent patriots, who signed the Declaration of Independence.

He served, with steady patriotism and ability, during several other periods, in the national congress, and state legislature; and always shared the difficulties and dangers of embarrassing seasons, in which fortitude, and inflexible constancy in the cause of our country were indispensably required, to ensure its safety and success.

He was a steady supporter of our present invaluable national constitution, active in allaying prejudices and misunderstandings on its first promulgation; and always firmly attached to its principles. He was a member from Pennsylvania, of the convention, ever respectable for its talents and virtue, which suggested and framed that instrument.

His benevolence of disposition, and liberality of sentiment, were always conspicuous. An instance the most highly honourable is, that of his having been a principal promoter of the amelioration of our state penal code.

He filled the honourable and confidential stations of president of the Bank of Philadelphia, and of the Academy of Fine Arts, from their establishment to the time of his decease.

What entitles him to our particular veneration, and most sincere regrets, is, his having been mainly instrumental in forming the society in the year 1785.

Although not a practical agriculturist, his conviction of the all-essential uses and general importance of such associations, induced and stimulated his successful exertions in our establishment.

He was a constant and well informed attendant at our meetings.

He assisted, with a zeal patriotic and intelligent, in promoting the knowledge and interests of agriculture; and afforded one among many other proofs, that practical husbandry depends, for its improvement and prosperity, more on science, and the acquirements of well educated and public spirited men, who devote a portion of their means, time, and talents to the principles of this FIRST OF ARTS, than on the

limited experience, and uninstructed examples of merely practical husbandmen.

Whilst the miseries and dangers of war, create a necessity for characters distinguished in the arts and works of destruction; and portraits of heroes are exhibited, as remembrances of achievements,—attractive,—because they are dazzling and brilliant;—we have deemed it as meritoriously exemplary, and as highly obligatory, to hand down to posterity, (so far as our humble efforts can accomplish the agreeable task,) a memorial of retiring, yet conspicuous worth and talents, employed in the equally honourable, and far more desirable and salutary, ARTS OF PEACE.

MEMOIRS

OF THE

AGRICULTURAL SOCIETY

OF

PHILADELPHIA.

On the cultivation of the Vine, in a Letter to the President of the Society, by Timothy Matlack, Esq.

Read June 11, 1811.

Dear Sir,

YOU and I are both old enough to know, that christianity and vine dressing are best taught by example. On the first you have had many excellent lessons, and I am perfectly content with your practice on them; but on the latter I suspect you have had less experience than myself, and therefore offer you a short lesson upon it, and recommend that you practice on this also, with an equal zeal. The interest of our country calls for the example, and your situation affords the opportunity of giving it the greatest effect. The lesson shall not only be short, but easy to practice: for I am persuaded, that so much has been said about raising vines, as to have frightened people with the ghosts of difficulties that never existed; the practice really being a very plain, simple business.

That our country is naturally fitted for the purpose is undeniably evident, from the spontaneous production of the vine in every part of the sea coast, from Georgia to Maine, and to the westward as far as we know any thing of its productions. Which is the best of those grapes, remains to be enquired; but it is ascertained, that several kinds of them are superior, for wine, to any of those called European grapes, hitherto imported into this country.—For example, the bull or bullet grape of Carolina, the Bland grape of Virginia, and Cooper's grape of New Jersey,* all of which stand our climate perfectly well, without covering; and their fruit, instead of being injured by the frost, as all the European grapes are known to be, is improved by a slight frost. Of the European grapes, the downy leafed vines have the important advantage, that the down secures them from the ravages of the rose-bug; these grapes are the "Miller Burgundy," the "White Morrillon," and above all others the "Genuine Tokay," which to the advantage of the hoary leaf, adds that of producing the best wine in the world; and growing in a country eight or ten degrees further northward than we are, may be relied on to stand our climate, as well as our own vines.

Thus far you will set down as preface: what follows is to be considered as a simple, plain lesson, and it shall be confined to the consideration of a single vine; because if the cultivation of one vine is well understood, the application of that knowledge to any number, is an operation of plain common sense only.

* A variety of the *Vitis Sylvestris*, or blue bunch grape. J. M.

In February, take a single joint of the vine you choose, the "Genuine Tokay" if you can find it, cut it off at half an inch above the eye, and again at two inches below the eye, cover each end with a sticking plaister of any kind, and set it in a pot of garden mould (about 5 or 6 inches diameter and unglazed). The eye of the cutting must be covered with earth, and then watered to settle the ground; after this lay half an inch of horse dung on the surface to keep it from becoming dry and hard. Place the pot in your hot bed, prepared for raising your cabbage plants, whenever that is ready. The vine will require no further care than that extended to your cabbage plants. If more than one shoot rises from the eye, rub off all but the strongest. About the first of June, turn out the vine from the pot and set it in your garden, or at the east or north end of your house, wherever it can be protected from violence. It will grow in any soil, but, like other plants, it grows best in the best soil. When first removed, water it at a distance from the plant, so as to draw the earth toward the vine, instead of washing the ground from it. If you water it afterward, pour the water into a trench at least eighteen inches from the plant; for unless this precaution be used, watering does more harm than good, and does most injury in the driest time. As the vine shoots upward, it must be supported from falling. No other care than keeping the ground clear of weeds is necessary for the first summer. In November, a slight covering of straw or Indian-corn husks, is beneficial in preventing a frequent freezing and thawing of the vine. In February it must be trimmed; and here

commences what I conceive to be the sole difficulty in cultivating the vine—to wit—to determine at which of the eyes it is to be cut off. What is here about to be said, deserves the more attention, as it applies to every succeeding cutting of the vine in every stage of its existence; goes directly to the ground and principle of its cultivation, and will not be found in any author who has written on this subject.

Every joint of a grape vine has its own separate pith. This most important circumstance commences at the lowest leaf that has a clasper* opposite to the leaf. A solid woody substance passing from the leaf to the clasper, through the vine, and connecting them together, cuts off entirely the communication between the pith and the joint below, with that of the joint next above; and so on, upward, at every joint through the whole length of the vine. And it is a circumstance not less important to be known, and kept in mind, that all the eyes below this first clasper are formed in the bosom of smaller and more feeble leaves; and that the base of these eyes does not extend across the vine, so as entirely to cut off the pith of the joint below, from that of the joint next above it: these eyes are therefore imperfect, and whenever you trim the vine, ought to be rubbed off.

* The word clasper is alone used to avoid prolixity; but this circumstance, in after stages of the growth of the vine, takes place, also, where the first bunch of grapes stands opposite to a leaf; which never fails to stand below all the claspers, which are indeed the barren fruit stems, and whose chief office is to support the vine and the clusters below them.

It is at this first trimming of the vine, that we begin to apply the principle above laid down, and it is here only that there ever can be any difficulty in the application of it: and this difficulty can only arise from the circumstance of so very feeble a growth in the vine, as not to have produced a clasper in any part of it, which will seldom happen; but if it should happen, the vine must be cut off at half an inch above the lowest strong full eye; otherwise it is to be cut off at half an inch above the first clasper, and in both cases all the eyes below are to be carefully rubbed off.

The eye thus left on will sometimes produce more than one shoot, in which case all but the strongest should be rubbed off, and that supported from falling down; which, except the keeping of the ground free from weeds, is all the care required for this year. In November, this shoot is again to be covered as before directed, and in the following February is to be again cut off just above the second lowest clasper; that is, leaving on two eyes to shoot this season, and again rubbing off all the eyes below the lowest clasper. Both these shoots should be permitted to grow to their utmost length; which, if the soil be favourable, will be very considerable, and there will be reason to hope for fruit in the next season.

Here you ought to be apprised that the lowest clasper appears higher up on some kinds of the vine, than on others: on some it appears at the third leaf, on some at the fourth, and on some kinds so high up as the fifth leaf; but the same rule is to be alike applied to all, and every eye below the lowest clasper be rubbed off.

In the third February cutting, three eyes upon each shoot may be left on, and not more, however strong the shoots may be. From this time forward all the side branches from the shoots of the year are to be rubbed off; taking great care not to injure the leaf from whence they spring, which is the nurse of the bud at the root of its stem.

At the fourth time of cutting the vine, and from that time forward, it may be cut about the last of October, four eyes on each shoot may be left; and at the fifth cutting five eyes on each shoot may be left on, but more than five eyes on a shoot, ought never to be left on, even in the most vigorous state of growth, at any age of the vine: for, however pleasing the increase for the year may be, the injury thereby done to the vine, will be seen and lamented in the following, and probably many succeeding years.

If it be enquired why a single eye is recommended, rather than a cutting of sixteen inches long, it is replied, that roots shooting from a single eye, are exclusively from itself, are much the strongest, and strike more directly downward; the shoot from it has less pith in it, the wood is firmer and shorter jointed, and comes sooner into full bearing; and appears to be much the most healthy vine. And to these important advantages may be truly added, that a thousand plants, fit to set out, may be raised from the single eye with less labour and within less space, either in a hot bed, or in the open ground, than a hundred plants can be raised from long cuttings; which have not, that I know of, one single advantage in their favour: and, in a new

country, it is of no small consideration that the same cuttings will produce five times the number of plants.

As to the manner of accommodating your vine to its situation, an active imagination would suggest a volume upon the subject, and possibly unluckily miss the only direction suited to the case; but, fortunately, the fact is, that a very small share of common sense will in all cases, be fully sufficient to supply the deficiency; and very little more will be required to apply the principle and practice here laid down, to an hundred or a thousand vines, whenever the people of the country shall feel the advantage, or necessity, of raising vineyards for a supply of wine within ourselves. A few examples by men of your standing, will lead them into the practice, in the only way in which we can hope for speedy success. And I pledge myself to you, that whether you immediately succeed or not, you shall derive a pleasure from the attempt itself, that shall amply satisfy you for every expense, of money or time, it shall cost you. Sporting with the long branches, bending them in festoons, and marking the growth of the fine clusters from the upper buds, that in this way may be preserved, and occasionally displaying them at a festive board, has the happiest effect upon the human mind—such as Bonaparte never felt. These are the proper play things of great men; and had General Washington lived to this day, I would have said to him "one thing lackest thou yet," in that, after saving the world from a political deluge, thou hast not yet planted a vineyard.

Lame by an accident and confined, I have cheated a wearysome hour by intruding this upon you; for

which I have no apology to offer, but that I think the subject worth your consideration, and that it is addressed to you from the honest motive of real respect —by

Your humble servant,
T. MATLACK.

Philad. 28*th May*, 1811.

HON. RICHARD PETERS.

POSTSCRIPT.

Mr. Matlack, in a very instructive lecture delivered to the Agricultural Society, by particular request, proved the accuracy of his theory, and the justness of his remarks, on the physiology of the vine. J. M.

On Hedges, by Richard Peters.

Read, July 9, 1811.

Belmont, July 8, 1811.

Dear Sir,

I enclose a letter from *Mr. William Neill*, on the subject of hedges, detailing his mode of planting. He says this practice is common in the county of *Antrim*, in *Ireland.* Accident presented to me the opportunity of seeing Mr. Neill's hedges, and I was highly gratified, and instructed. He has no fear of frosts undermining his banks, after a year or two ; and is not much alarmed at any time. I stated to him all my objections ; which did not seem to make an impression. I never beheld more beautiful and flourishing young hedges. The ride to his little farm would be amply repaid ; if any person wished to imitate his spirited example. The whole operation can be viewed, from the commencement of the work to its completion ; and more learned in an hour, than could be understood from a description on paper of any length, or minuteness. He depends, for the security of his bank, and ditch, on the roots of the thorn matting and retaining the earth in its place. He says no accident has hitherto happened, occasioned by frosts. When we re-entered Philadelphia, in June 1778, after the British troops had retired, a great part of the commons in the city plan were neatly enclosed by ditches and sod banks, with *bermes* of about a foot or eighteen inches wide. But the succeeding winter undermined almost the whole of

them; and the banks filled the ditches. I have seen such accidents frequently. But *Mr. Neill* thinks his quick roots and good workmanship, will prevent such casualties. He wants no protecting fences; and his inclosures are at once secure. Comparative experiment must decide between the advocates for plain hedging; and those who deem the ditch and bank preferable.

Yours, truly,
RICHARD PETERS.

DR. JAMES MEASE.
Secretary of the Philad. Soc. for promoting Agriculture.

Nov. 2, 1812. This season has been very unfavourable to the *leaves* of thorn hedges. In the summer I visited the gardens and shrubberies of Mr. M'Mahon. I had not seen them for some time, and was agreeably surprised by the perfection to which he has arrived, in a short period. But most of his thorn plants were leafless. The *New Castle* thorn was an exception. I never beheld a more verdant, vigorous plant. The contrast with other thorns was striking and captivating. He, with reason, prefers it, on every account. He says the objection of slow growth, is not founded on fact. It has every valuable attribute of other thorns. It superadds the capacity of resisting the maladies, and thriving amidst the misfortunes, to which others are subject.

RICHARD PETERS.

On Hedging and Ditching, by William Neill, Delaware County, Pennsylvania.

Read July 9, 1811.

16 *Mile Stone, Phil. & Lan. Turnpike,*
June 8, 1811.

Sir,

According to promise I proceed to give you what information I can, respecting a mode of hedging and ditching, which in my opinion is the most complete method yet found out, and if well done the cheapest also, as you receive its benefit from the first day it is made; whereas in hedges planted on the surface you have long waiting, and as much expense in protecting them, as would complete your hedge and ditch at once: nor will they be ever half so formidable when done; a country that abounds so much with hogs, requires good fences, and if planted in the last mentioned way, if they succeed ever so well, hogs will always work through under: whereas the ditch and bank make all so dark below that they will rarely attempt it. Many other advantages attend it; they are easier kept clear of weeds; the weight of the bank keeps a moisture about the root; they stand dry seasons better, grow quicker, nor are they half so apt to die, as when planted in the other way. Good ground always produces the best hedge if managed properly: and although I had as poor ground as any man in his senses could wish for, and it was also high and dry, yet by manuring the ground, and attention, I have four successive years planting,

perhaps not excelled in any country :—keep them from the shade of woods or trees as much as possible.

Method of making the Hedge.

You first lay down stone convenient to where you intend your fence, say one cart load of middle sized stone to 15 feet;—then run your line where you design the front of your bank, and close to that line lay one row of stone compactly together; then move your line 12 inches out, towards where you design to dig your ditch: the last 12 inches remain in front of your bank, to keep the frost from working under, till the roots grow through to bind the earth together, which they will do in three years :—with a spade cut along your line the depth of a good sod, keeping the face of your spade always in towards your ditch: then lift your line, and lay it four feet apart from the last, and cut with the spade as before; then sod off the four feet between the last two lines, and throw it back behind your row of stone: let the mother earth on your sod be mashed fine with the spade, and drawn in with the hand carefully to and over the stone to the depth of two or three inches, then lay your thorns in a horizontal direction, the top rather inclining upwards, at six inches apart. Advancing two or three inches through the stone, carefully drawing the nicest mother earth with the hand over the root; the next row is of middle sized stone, (but be as careful as possible not to pinch your plant between flat broad stones,) and go on with row of stone and layer of earth until your bank is three feet six inches high, your ditch three feet deep carried down so as to

meet at two feet at bottom: in raising the wall in front of your bank, carry it up almost plumb, for as your earth settles down, your wall will lean back and become too shelving.

I am, Sir, respectfully, Yours,
WILLIAM NEILL.

HON. RICHARD PETERS.

On the same Subject, by the Same.

Read January 12, 1813.

16 *Mile Stone, Phil. & Lan. Turnpike, November* 28, 1812.

Sir,

The spring before last I made 360 feet of hedge and ditch; which cost me, as near as I can recollect, as follows,

13 days work at 3*s.* 9*d.*		*L* 2	8 9
Boarding the men,		1	10 0
5 days of a cart and 2 horses hauling stone at 2 dollars,		3	15 0
800 thorn plants,		1	10 0
Whiskey to the men,			11 3
	$ 26.	*L* 9	15 0

360 feet, allowing 10 feet to the pannel, make 36 pannel which, will cost about 5*s.* 5*d.*

Post and Rail in this place will cost, 5 rails at 9*d.*	3	9
Post,	1	2
Putting up,	2	4
	7	3

You perceive, sir, by this, that the stone constitutes more than one third the whole expense, those who have stone in their way, or on their own ground, can have that part at little or no expense : one good cart load will face 15 feet, but where stone is difficult to be obtained, rather than do without, I prefer laying one row of stone under the plant and two above : this mode keeps them close about the neck, and hinders the earth from mouldering away ; it likewise keeps weeds from growing so close up to the plant as they otherwise would do ; then, by giving it a good high top of earth, and running one good broad rail along the top, it will turn cattle till your thorn gets so up as to make a good fence ; which they will do in four or five years with all kinds of thorn fence. Calculate so as to have them round those fields you intend to have in with grain, or grass, for two or three years ; or the longer the better. By turning in your cattle in the fall, they will brouze on them, especially calves and sheep ; but they will do little or no harm, as you will of course clip them in the fall or spring. I have made about 450 pannel of that kind of fence ; the oldest is five years old, and has stood four winters, without losing a stone by frost, or mouldering down ; nor do I expect they will. I lost about three yards by the floods last summer ; but that was my own fault, in not having a passage for the water, in a place where one was required. The stones and bank were swept off, but the thorns kept their places. Several of my neighbours tried them, and my opinion is that they will stand on any kind of ground, excepting swampy ground. Mr. William Siters, of Radnor, planted one thousand in swampy

ground, about two years ago, and rolled on large heavy stones that required two men to lift them up. The spring following they all sunk down. But give them dry ground, and moderate light stone, say from ten to thirty pounds, and they are more secure. In laying out the fields, they ought to be so planned, that as little water as possible would run into the ditches ; except what falls from above. And by leaving one foot escarpment, by the time that foot wastes off, so as to bring it into the edge of the stones, it will be at such a degree of level as to moulder no more ; unless carried off by water from the bottom. It will likewise get matted over with grass ; and in a very few years, the thorn roots will bind all together. In Europe, we always had the best and earliest pasture on those banks and ditches, so that we never considered it as waste ground. I imagine the weight and shade of the bank hinders the frost from penetrating or getting into the ground in that part, as much as it otherwise would. As to trimming, I think I have reduced it too much. I have all along trimmed in July and November, and thus kept them very nice. But the two last years they grew little or none after the July trimmings ; and are beginning to show other bad effects on the plant. Some I trimmed this summer, and some I did not, and I see a material difference in favour of those I did not trim, therefore, I will confine my dressings to fall or spring. The two first years trimming is useful. It gives those of slow growth a chance of keeping up with those that are more luxuriant.

Where I became first acquainted with hedges, unless around kitchen gardens, or towns, or villages, where

lots were small, you would not see one in five hundred trimmed. They, in general, let them grow till ten, twelve, or perhaps twenty years old, then, with a sharp handsaw, take them off a few inches above the bank, when you would immediately have a more formidable fence than ever, and so on for ages. The best way to proceed by those who wish to adopt this method, is to find a man who has wrought a little at it in Europe, and agree with him by the rod: the common dimensions that I have made, he could perhaps afford to do at twenty five or thirty cents a rod, if found in all necessaries. Then lay down all your plants, in a state of growing, early in spring. By that means he can work all summer, and you have no other trouble than provide him in stone. This way was much practiced in Europe. By all means let them be kept clear of weeds the two first years. My hedges are in general handsome, but I have no thorn I value so high as the *American Cockspur.** It will make a fence which nothing can get through.

I am, very respectfully, Yours,

WILLIAM NEILL.

HON. RICHARD PETERS.
President, Agric. Soc.

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* *Cratægus Crus galli. L.*

On French Rye, and Syrian, or Jerusalem Wheat, by Richard Peters, Esq.

Read July 9, 1811.

Belmont, July 8, 1811.

Dear Sir,

I send by way of report, of the success of the grain, transmitted by general Armstrong, from France, a few heads of the big rye, and the *blè d'abondance*, or Syrian wheat. Both have arrived at perfection, beyond my expectations. I was obliged to cut my rye a little too early, so as to escape the ravages of the birds and poultry. But a sheaf feels heavy, as if every grain were a pigeon shot. Some of the heads are lighter than others; possibly, because they should have been left a few days longer. It was cut the 1st of July. Out of two quarts, I gave away, in small portions, all but half a pint. I regret that some have had it, who have paid to it no attention. Finding that the balance left to me was so small, I was compelled to take pains to remedy my over-liberality. I stretched my garden lines and took a rake head (wooden) and dotted along the line with the rake teeth. In every hole I dropped a seed. The drills 18 inches asunder. I discovered that each seed produced three plants, two whereof I transplanted, as they grew vigorous, at unequal times. By this means, I have 18 tolerably sized sheaves, which I think will produce a bushel,—probably more. The transplanted is universally the largest and best. The smallest heads of the original growth, are larger than the

one sent as a sample with the seed from France. There were 25 and 26 spears from each plant in most of the stalks. Of the Syrian wheat I had but a pint left, after distribution of the rest. I have failed in several attempts with this grain heretofore. The mildew has generally caught it before maturity. I sowed this in drills, 18 inches apart. I shall cut it now without delay. But it has not yet been ripe enough. Both rye and wheat were kept clean; and hoed two or three times. Of the wheat I shall have much more than of the rye. But I value the rye the most, being convinced, if it will suit our climate, it will become a great and valuable addition to our stock of grain.

The sainfoin grows vigorously. The wild rabbits devoured all above ground, in the winter; prefering it to every thing else. Possibly it saved the rye and wheat, to which it was near. The birds have robbed me of every seed, save a handful or two. Probably I have more rye and wheat owing to this preference of the sainfoin. The largest and best heads of the transplanted rye, were those set the latest. I transplanted, from time to time, till the second week in November last.

RICHARD PETERS.

DR. MEASE.

Secretary of the Agric. Soc. Philad.

Remarks on different Grains, by Richard Peters, Esq.

Read November 12, 1811.

Belmont, August 10, 1811.

Dear Sir,

I give through you, to the society, the results of sundry experiments made in the present and past years, on subjects which may be useful; and particularly on those which, as they relate to the society, I think myself bound to report.

The *foreign grain* sent by general Armstrong from France, mentioned in our second volume Memoirs, page 140.

No. 1. The *wheat*, said to be of African origin—sometimes called *Egyptian* wheat, and *Le Blè d'abondance*. Called also *Syrian*, and *Smyrna*, wheat.

I have, this third time of sowing this wheat (having in two former trials entirely failed) completely succeeded; though it was not placed in a favourable situation. From a pint, drilled and hoed, I have obtained a bushel and one peck of grain, well filled, thin skined, and very farinaceous. We have been this season highly favoured with freedom from mildews or blights, in our grain crops of every species; and have had an abundant harvest. No doubt this wheat partook of this felicitous circumstance. I sent to the society, samples of the heads and straw. The former really warrant the appellation, of *Blè d'abondance*, given to this wheat. I had six heads of very good common bearded wheat selected. and the grains contained in

them counted. In these were contained an average of $37\frac{1}{2}$ grains each. Six heads of the *Blè d'abondance*, not selected, but taken at random, contained an average of $93\frac{1}{2}$ grains each, and the aggregate heavy in proportion. Each grain, I believe, contains as much farinaceous substance as that of the common wheat, though in shape more globular, and not so long. The straw is so powerfully strong, that it resisted all winds and heavy showers, and remained erect, while other grain fell, wholly or partially, under the attacks of wind and rain. I fear, however, that reapers will complain much, while cutting any extensive field of such grain. I shall sow it this season in broad cast, and inform of the result. It ripens somewhat late, and I most dread the mildew, blight, or rust.

No. 2. *The big rye.*

I sent a sample of the heads and straw. I have obtained one bushel from half a pint, drilled and *transplanted.* Both the grain and straw have undergone a change from those sent by General Armstrong. The grain is flinty, like rice, and the straw more pipy. I have heard the same account from some of my friends, to whom I distributed parts of my original stock. I should be indeed sorry, if it should continue to exhibit such symptoms of deterioration; having formed high expectations of the superior excellence of this grain. I find it to be a fortuitous discovery in France; and cultivated, to any extent, but by a few: by our D. Parker, Esq. the most. It ripens early, and about the same time with winter barley; which it resembles more than it does our common rye. I continue to cherish favourable hopes as to this grain; and

shall sow it this season in broad cast. Perhaps the grain may be more soft and mealy in some other soils than such as mine. The rye was situated near the wheat; and, though stronger than our common rye, it fell much, under heavy rains; but received no ultimate injury. It is certainly an extraordinary kind of grain, in size and weight; and well deserves repeated trials and persevering attention; both as to soils, modes of culture, and situations. I have sent to France for a supply of seed grain of this species of rye. The wheat and rye thresh as kindly as common grain.

No. 3. *L'orge fromenter*, or wheat-barley.

I gave away too much of this grain. I had but a small portion left for my own experiment. I have, however, obtained more than two bushels; which I shall sow next spring. It resembles wheat, and continues its good qualities far beyond the rye. I deem it a valuable species of grain. I sowed it broad-cast.

No. 4. Sainfoin.

Of this grass, I continue to hold the same opinions I have heretofore entertained. I have it in perfection on a small scale; which requires labour and expense in cleaning and hoeing the drills. But I am not flattered, by the appearance of this specimen, into a persuasion, that it will succeed in fields where the weeds would overpower it, in its young state, and this is the case with most fields in our old settled country. I have repeatedly endeavoured to cultivate this grass, in every way. But I have never been encouraged to extend my endeavours to any great length. If others have succeeded, I am not informed. I highly esteem

the qualities of this grass; and am not a little mortified, that I have so repeatedly failed in its culture. I have been lately told, that, in the state of New York, it has been cultivated to no great advantage. The same result has occurred in South Carolina. Endeavours should not cease; because discouragements have happened in several attempts. In some quarter of our country it may succeed; and no plant, for soiling, pasture, or hay, can exceed it.

I had, two years ago, about two quarts of the *South American white oats* presented to me. I carefully attended to the culture of this most excellent grain: in every way superior to the common oat of our country. It was white, full and heavy, originally, but now the produce of this year is tawny and deteriorated. It is yet more productive and heavier than the common oat. My usual bad luck attends me, in my endeavours to continue grain in its original state of perfection. I can charge myself with no *gross* neglect or inattention.

My common wheat of this year was a good and plentiful crop; but not equal to some crops I have had off the same field. I cannot account for the disparity, as I took every degree of pains in the preparation of the field, and cultivation of the crop. The field was limed the year before, and last year well dunged. Possibly the seed has been too long on my farm. My pea ground did not this year equal my expectations,

though the grain on it was good, and thought by several farmers from good farming counties, equal to the best they had seen. The heads were large, but it did not tiller or stool, as in former years.

I rolled my seed wheat in plaster, and, having wet the grain before rolling, it swelled, and the sower apprehended he should be deceived as to the quantity of seed per acre. This might have been the case. I left about half an acre, sown with wheat, unplastered. The difference might be seen at any distance from whence the crop was visible. That rolled in plaster, shot into heads a week sooner than the other, and always retained a superiority. The shirts of the reapers were redened with the rust off the unplastered wheat. But not a straw of that plastered was in the least discoloured. Its backwardness as to maturation, which was very perceptible, exposed the unplastered wheat to be attacked by the rust. I have frequently experienced the good effects of *rolling* wheat or other grain in plaster, but I have never found any advantage (except on buckwheat) in strewing the *gypsum* on grain as a top-dressing. I was formerly of opinion, and succeeded under it, that *thin sowing* was, in clean and fertile ground, the best. But I am now convinced that, by some shift of circumstances, and change of seasons, our fields, in whatever state of either fertility or poverty, require more seed than we have heretofore been accustomed to sow. I shall encrease my quantity generally hereafter; never having sown more than a bushel per acre. I will also make some particular comparative experiments, as to quantities, on different

acres. Cold and unfavourable springs have, for several years past, retarded the early shooting of the plants, and in such case they do not stool as formerly.

In the beginning of the last April, I *harrowed* my wheat field, except that part on which I had sown peas. The benefit of this operation was surprising to those not accustomed to it. The stubble will *now* show the last stroke of the harrow. I have practiced this heretofore, and never failed to profit by it. But I cannot persuade my own tenants to harrow even one acre. I could scarcely prevail on my ploughman to perform this highly beneficial operation; which at length he consented to, under a *protestando*, that he should lose no credit by my failure, as he had remonstrated against it. He has now changed his opinion. My *timothy*, sown with the wheat, was *denounced*, as devoted to ruin. But this prophecy has completely failed. I repent that I had not harrowed a part of my pea ground, as I now attribute its inferiority to its not having been harrowed.

Last year I planted (for the first time) some curious Indian-corn; having ears of a deep red, and stalks and leaves with a cover, like silk or fine linen dipped in blood of a deep tinge. The stalks and leaves will dye a durable deep red, inclining to purple. This corn, again planted, has, this season, discoloured, or tinged and spotted a great part of the corn of my garden and field; though kept at a great distance from the corn in other parts. This effect is more striking than I have been accustomed to, but it is not new to me. What surprises me, however, is, that, in the ground in which

I first planted the red corn, I have this year planted delicately white seeds of early corn, carefully selected. In this spot, in which I am certain not a seed of the red corn was either left from the crop of last year, or planted this season, there are very many of both stalks and ears, entirely (in colour) of the species of the red corn. My old farmer says it is owing to the *meal*, as he calls it, dropped from the tassels of last year, remaining in the ground. But as this is not, as appears to me, botanically correct, I leave the fact to be accounted for by the learned. I shall banish this red corn entirely. It is an additional proof of the difficulty attending attempts to continue any species of grain, free from mixtures with other varieties of the same genus. The hybridous connexion can be effected, notwithstanding every care, usually taken, is practiced. It is also a warning not to indulge in varieties; when, by adhering to what we know to be good, we may ensure both comfort and substantial advantage. This lesson would not be amiss, in our more important concerns.

The white and yellow corn of both this and the past year, though not near the red, have played the back-game on it; and very perceptibly altered its tints. Insomuch, that, on many hills of the present crop, the redness is scarcely distinguishable. Yet I was careful in selecting ears of the deepest red, for this year's planting. Thus it is with every species of the same genus of plants; the *farina fecundans* whereof floats in the air to incredible distances. But where the colour is remarkably different, the mixtures are the soonest, and the most strikingly perceived; while that distant

from the colouring matter, though slightly tinged, passes without notice. The next season I must change the seed of all my corn, by procuring it from distant farmers.

Yours, very truly,
RICHARD PETERS.

DR. JAMES MEASE,
Secretary, Phil. Agric. Soc.

July 15, 1812. No. 1. The *Smyrna* wheat is now ripe, and fit for the sickle. It is a fair promising crop, and has withstood the storms and unfavourable season, far beyond any other grain. The harvest is later, at least ten days, than it has been for many years past.

No. 2. The *big rye*. I have lost this crop; and am not a little mortified. It was sown too late, owing to a gross mistake of my farmer, who sowed the *wheat-barley* instead of the rye. Having no other ground prepared, I was obliged to sacrifice the barley, and in its place sowed the rye, in the second week of November. Still it would have done well in a common season. But a violent storm of hail and heavy rain, broke the stalks, and prostrated the greatest part of it. I shall perhaps have a few bushels, some tolerably good, but most of it shrivelled. If Sir Joseph Banks's doctrine be true, my shrivelled grain will continue the species. I expected a quantity from France. But Mr. Parker informs me, that he had but a pint to begin with; and this was found in the knapsack of a dead French soldier, who had traversed various regions, in his campaigns. It is not known in what country he found it.

Mr. Parker has never been able to sow more than two acres, in any one season. He sent a bag of the grain, intended to be brought in the *Constitution frigate*. A culpable inattention, in those to whom he gave it in charge, has rendered his kindness abortive. It was left at Cherburg. Mr. Livingston, of New York state, told me, that, by accident, some of this grain (obtained from general Armstrong) was sown in the spring; and it has thriven so well, that he believes it to be a summer grain. Few of those to whom I distributed grain have informed of their success. This neglect is too common in all such cases, and highly discouraging.

No. 4. The sainfoin continues to give me unfavourable prospects of its ever doing well.

I obtained a fresh supply of the white oats; and it promises to be a great crop. I distributed several parcels of it, and those to whom I gave samples speak highly in its favour. My friend, general C. C. Pinkney, who sent me the white oats, also sent some six rowed rye. I have sowed a small part of it this spring, and it promises well.

In consequence of the opinion as to quantity of seed, I mentioned in the foregoing letter, I have tried various quantities on different acres. All are good; but I think the grain from one bushel and an half of seed has the largest heads, and will yield the greatest number of bushels. I have a fine harvest, but much of the grain fell, and is deteriorated by this misfortune.

The wheat of this season has, generally, smaller heads and more straw than usual. Wheat is never perfectly well eared, unless its growth is gradual. The crops were retarded by an unfavourable spring. They

came to their full growth too rapidly, when the weather became warm. We have suffered little by mildew or blight, but the Hessian fly has infested some of my neighbours' fields. Some farmers, not accustomed to heavy and luxuriant crops, say, "Give me straw in plenty, and I will ensure enough grain." I have never observed the soundness of this remark. Land applying its powers to a crop of straw, has the less to give to the ear. The heads of my grain have been invariably the smallest, when the straw was the most luxuriant and rank. The falling of the crop, too, is not the least of the evils of over abundant straw. Sowing too much seed encreases the numbers, but not the strength of the stalks. I was, in my youth, an advocate for three pecks of seed per acre. I now think five (or six at the utmost) pecks sufficient.

Contrary to all expectation, at the opening of this singularly unpromising season, my crops of grass have been abundant beyond most former years. I believe the grass crops have, every where, been good: especially on high grounds. My watered meadows are inferior to other grass lands. The season operated on them very unfavourably. Labourers are more scarce than they have been for many years. The causes may be readily assigned. R. P.

POSTSCRIPT.

November 1, 1812. *Syrian, Smyrna,* or *Jerusalem Wheat. Blè d'Abondance.*

To this grain I have now given the fairest experiment within my power, but I do not think the field in

which it was sown, was eligible; though it was the only spot I could devote to its culture. The grain was sown among apple trees, and I was compelled to cut the shaded parts too green, lest I should lose the rest, by over-ripeness and consequent sheding. I am convinced that it merits the French appellation, for I had, of this grain, at the rate of forty bushels to the acre; when of the common wheat, in the same field, my crop averaged about twenty five bushels per acre. Storms of hail, and heavy rains, layed and injured my other wheat, but had little effect on this, owing to the strength of the straw. It is, nevertheless, as easily reaped, as any other grain.

I sent to the capital mill of Messrs. Robeson of Roxborough, six bushels of the wheat, for experiment as to flour. They endeavoured to make the best flour, but failed. Mr. Peter Robeson, than whom there is none more capable, assisted with his advice. But the report I received with the flour was so discouraging, that I had devoted it to my hogs. I nevertheless was determined not to yield without a trial of its esculent qualities. I ordered my cook to make a loaf of bread of this unpromising material. She complied with some hesitation. The result was an agreeable disappointment. The bread was remarkably light, but very brown. It rises with little yeast, and requires little water. I continue to be fond of brown bread, and I never ate better. I have submitted it to the palates of several friends, some of whom are fastidiously nice in such matters; yet they all agree that no bread can be better, in every respect. My family, who all generally prefer white to brown bread, now confine themselves

to this. I informed my friend P. Robeson of this circumstance. He sent a defiance to my cook, and desired her to try her skill in making pie crust, from this "harsh and stubborn flour." I directed a meat, and a fruit pie to be made.—The crust, or paste, is really better than the bread, and its colour is more inviting. So that this species of wheat must be reserved for household consumption, and other kinds raised for sale. Its abundance will recommend it as economical, and its excellent qualities as an esculent, will ensure its expenditure. Possibly those who raise it in more propitious situations will have more success in the manufacture of this grain into flour. In all substantial requisites, no grain can be more profitable. But as an article of merchandize, it will not be extensively cultivated. The starch of this wheat is peculiarly white, but it cannot be separated from the husk. This latter contains the animalized matter; and is the cause of the extraordinary sweetness and nutrition of the bread. See vol. 1, page 227.

Large Rye. I gleaned a few bushels from the wreck of my crop. I have distributed and sowed all but half a bushel, which I reserve for experiment as a summer grain. I have heard, that in Virginia, some of the specimens I sent thither, have far exceeded any raised in this quarter. Our products from this grain have been generally flinty, though the original stock was not so. It is very desirable, that those who have received the grain, either through my distributions, or in any other way, would inform of the results;—a return, seldom, indeed, experienced! The straw appears substantial, yet it too commonly, in damp or wet weather, yields to the weight of the head.

Chili white Oats. This grain is much improved this season. I have threshed my little crop, and find it heavy, and I think equal to the Irish oat in weight, and superior in appearance.

Egyptian Oats. I have also threshed out this small specimen, and have a few bushels for further experiment. I think highly of it, but it is not equal to the Chili oat.

The six rowed Rye. This is one of the handsomest culmiferous plants. It appears with beards or awns, more like barley than rye. My experiment was on so small a scale, that I can pronounce no practical opinion. It is a dwarf plant, and must be very productive to render it worthy general attention. Those who send grains for experiment, should designate the times of sowing. I cannot yet tell whether the dwarf rye be a summer or winter grain. I sowed part of my sample in the spring, and have sown the rest in this autumn.

R. Peters.

On a simple Wheat Drill, by Mr. John Lorain; with a Plate.

Read January 14, 1812.

Tackoney, December 17, 1811.

Dear Sir,

Agreeably to your request, the bearer brings the four coulter drill plough, the merit of which consists in the simplicity of its construction. The leathern bottom of the seed hopper forms the principal superiority of this tool, rendering brushes and complication unnecessary, and yet I have not observed the seed bruised, or the delivery of it either uncertain or irregular. It came to me with a tongue, but finding two horses entirely unnecessary, a pair of old shafts were fixed to it, and one horse, a man, and an active boy, were found sufficient to drill at the rate of six acres per day; the boy leads the horse, and the man, walking behind, observes the delivery from the funnels, lest any thing, accidentally mixed among the seed, should retard or stop the delivery; and also to clear away from the coulters any rubbish they may gather, when it is likely to stop the funnels. This is best done with a light handy pole, sharpened at the point, and an upright thumb left near the point of this pole, and with such an instrument as this, and proper attention, the horse need not stop until the through is performed, unless an occasional stump happen to be in the way, and over this the plough is readily lifted. At the end of each through, the boy turns the horse,

while the man with ease lifts up the plough, bodily, and sets the wheel in the track of the outside drill, taking care to place it far enough back for the grain to have time to run down the funnels, and commence delivery in the drills at the proper place. The horse should not stop until the through has been performed, as the seed delivered from the axle, previously to stopping, will run down, and the whole will be deposited immediately under the funnels—but if an unavoidable accident should make it necessary to stop the horse, before the through is performed, the plough must be lifted up, and the horse backed sufficiently for the funnels to commence delivery at the proper place, or there will be a vacancy left unsown.

The person from whom I purchased this plough, near Downing Town, conceived that it sowed rather more than one bushel per acre, on his grounds; but it was found here to sow but little more than three pecks per acre, and the notches in the axle were altered to sow nearly two bushels per acre.

The farmers who have used this plough, say that the falling in of the mould after the coulters, forms a sufficient covering for the grain, and that the mouldering down of the soil through the winter, is very beneficial to the crop; but in this I believe they are as much mistaken as they are in many other things. My grounds were level and in fine tilth, yet the trivial inequalities of the surface were sufficient to prevent some of the coulters from sinking sufficiently deep for the mould to fall into the furrows and cover the grain, while the rest of the coulters went quite deep enough to effect this purpose: a rake harrow, attached behind

the plough, so as to rise and fall, but not swerve from side to side, will answer this purpose. My drills were covered by a light fence rail, extending across them, and drawn up and down the lands by a horse, for this was considered better than leaving a good deal of wheat entirely uncovered, and exposing that which was covered to the running, settling and freezing of water in the drills throughout the winter, which cannot be otherwise than very injurious to the plants. Two of the coulters are fixed in the plough, and also two hoes, which were made for a hoe harrow. I have found four of the latter, fixed in the drill plough, to effect every purpose to my entire satisfaction, of horse-hoeing the wheat after it is up, and they will do this from skiming the surface to any desirable depth, the horse, in walking, straddles one of the rows of wheat, and a man leading him, will horse-hoe more acres per day, than could be drilled with the same tool. Triangular hoes are less expensive, more effectual, and stronger, either for the drill or a hoe harrow, but those I used were ready made, and on the farm. If this plough is made by a plough maker, it should not cost as much as a common swing plough, but any farmer who can use tools tolerably, may make it for himself, either in rainy weather, or when he has little else to do, and almost any thing will answer for funnels, as may be seen by the motley mixture of mine; but tin is best, for the grain is heard running down it, and the tin being smooth, the grain is not liable to be stopped in its progress.

Yours,

JOHN LORAIN.

DR. JAMES MEASE.

PLATE II. FIG. 1.

A side view: a, b, c, d, the end of the seed box, which is thirteen and an half inches wide at top, eleven inches deep, gradually lessening to five inches at the bottom: this bottom is soal leather, and is punched with holes directly over the mortises in the axle placed under it. The leather is made to fit close on the axle. The coulters are twenty one inches long; the upper part is of wood, the lower end is sheathed with iron, in front, and is seven inches high, and five inches broad. The back of the lower part of the coulters is grooved to receive the end of the funnel, n, o, through which the seed drops into the drill, made by the coulter.

FIG. 2.

Is a view of the axle. There are four sets or rows of mortises, the rows are eleven inches apart from center to center: and there are seven mortises, at equal distances round the axle, one inch long, three fourths of an inch wide, and three eighths deep, at the further or outer end, and gradually lessening in depth, inward, to nothing.

FIG. 3.

An end view: a, b, c, d, represent iron rods extending from the cross bar of the frame to the fore part of the coulters. The heads of the coulters penetrate the fore part of the frame at g, h, i, k. l is a board, $4\frac{1}{2}$ inches in diameter, placed upright before the axle, and resting upon the edge of the hoppers, to direct the seed into them. It is supported by a shoulder in the frame, against which it rests. The hoppers are represented by the letters m, n, o, p. q, r, are handles to lift the drill at the end of the field.

Reference to the Plate.

FIG. 1.

		ft.	in.	
From a to b,	- -	1	2	
b to c,	- -		10	
c to d,	- -		5	
e to f,	- -	1	4	
e to h,	- -	3	3	
i to k,	- -	3		
l to m,	- -	2	4	1-2
n to o,	- -	1	2	

FIG. 2.

		ft.	in.	
From a to b,	- -	3	8	
c to d,	- -	1	3	} Circumference.
c to f,	- -	1	2	}

FIG. 3.

		ft.	in.
From a to b, b to c, c to d,	- -		11
e to f,	- -	3	3
e to h,	- -	3	3

The wheat drill, described by Mr. Lorain, was originally invented in Sussex county, New Jersey, and first described by the late Mr. Rutherford, in the Transactions of the Society of Arts, of New York. One of the drills is deposited in the Room of the Agricultural Society, Philadelphia. J. M.

Wheat Drill.

Fig. 1.

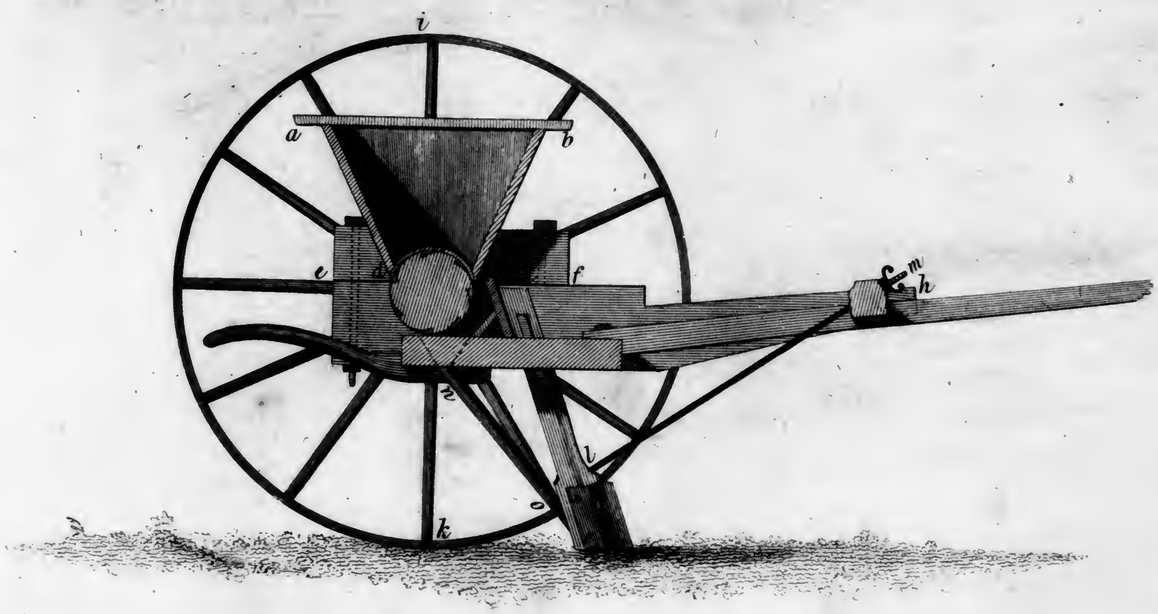


Fig. 2.

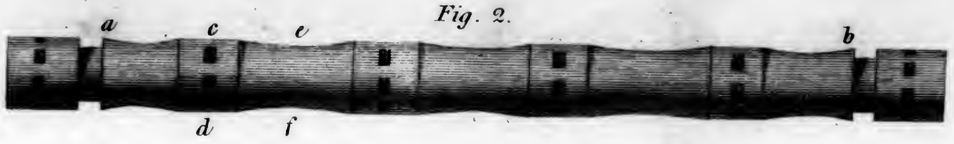
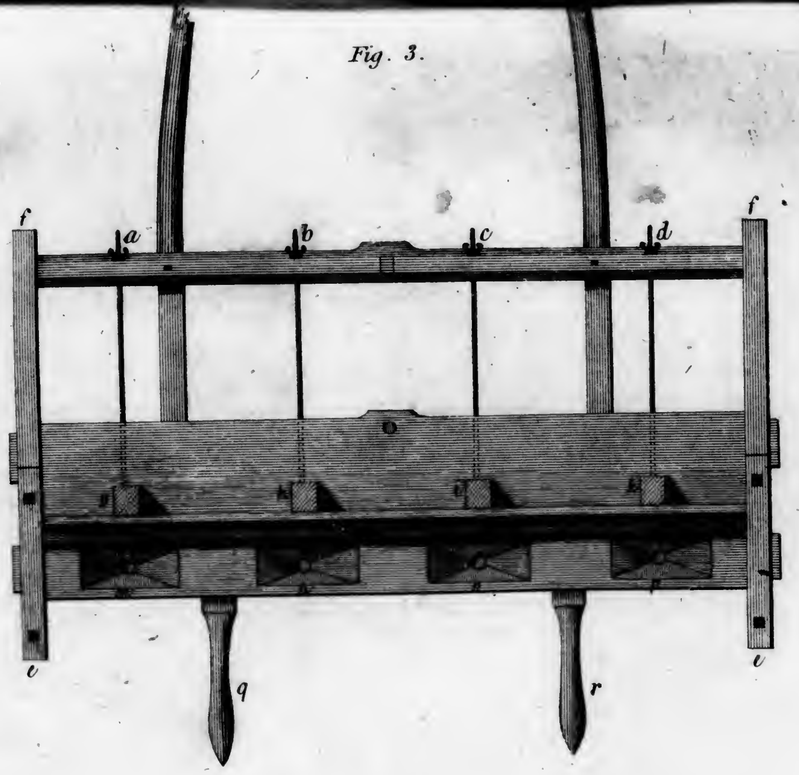


Fig. 3.



W. Strickland Del.

Engraved for the Memoirs of "Philadelphia Soc. for promoting Agriculture" Vol. 3. 1814.

H. Anderson fc.

On the use of Lime in England, by James Ecroyd, Farmer, Philadelphia County.

Read April 14, 1812.

Reading lately the Memoirs of the Agricultural Society, on the subject of lime, and having been accustomed from my youth, to see it used as a manure in England, I thought some observations on the subject might not be uninteresting to those who may not have had similar opportunities.

I will first observe, that the parts of the country containing the different qualities of lime, are as obvious in their productions and appearances, as the effects produced by each species, when employed in agriculture. For instance, in the fine rich grazing farms in Craven, and all along the course of the river Ribble, the lime is of the mild kind, and the soil the most prolific for grasses perhaps in the world, but the country is so mountainous and the climate so rainy, that very little grain is raised except oats, so that the lime when used as a manure, is mostly spread on grass without ploughing, and appeared to answer better on springy wet ground, that had been previously well drained, than on any other. This lime was generally carried on the backs of small Scotch ponies, with wooden pack saddles, from twenty to thirty miles, and laid on at the rate of two hundred bushels per acre: and the ponies returned laden with pit coal. The Leeds and Liverpool canal was not then finished, but it now runs through this beautiful lime country, and transports it

into Lancashire, which abounds with coal, and carries back coal to burn the lime.

Chymistry, had not then been so much applied to Agricultural purposes as now; and I have heard intelligent men frequently give it, as their opinion, that the caustic quality of the lime, had little or nothing to do with its vegetative powers, and that the only operation it performed, was mixing intimately with the soil, and pulverizing and making it more porous: and the principal reason for this supposition was, that the more was laid on, the more it fertilized, whereas, had it acted by its causticity, it might have been over done, and as this part of the country produces but one kind, they could not judge by comparison. The whole of this lime, in its native bed, appears a solid body of chrystals or spars, from ten to fifteen feet thick, and lumps of it make handsome ornaments for chimney pieces. I frequently have seen it laid on so thick, that at a distance it appeared as white as snow; it was commonly laid on the sod, and left to mix of itself, with the earth; though some, more enterprizing than the rest, had begun to lay on half that quantity, and harrowed till it was well mixed with the top earth, and found its vegetative powers much encreased.

I moved from the county of Lancaster, into the West Riding of Yorkshire, a district where tillage farming is managed, perhaps to as great perfection, as in any part of England, where I have had an opportunity of comparing produce, owing to the improved turnip husbandry, by hoeing, introduced by the Marquis of Rockingham, and on a soil that before this introduction, was deemed scarce worth cultivating, I

have heard farmers say, that it would scarcely yield six bushels of wheat per acre. Here I was also in the middle of lime again, and had an opportunity of seeing both sorts in constant use; the mild, or Knottingley lime, we had to fetch in carts or waggons, twenty two miles; and was used as a top dressing, for clay, or low lands well drained, as in Lancashire, at the rate of one hundred bushels per acre, on old sod; though the more we applied the better, yet when harrowed in, its vegetative effects were very conspicuous for twenty years. What the appearance of this lime is, in its native bed, I do not remember, but the appearance of the country producing it was good.

For the plough-farming we used the caustic lime,* of such a quality, that if more was applied than a chaldron or sixty four bushels per acre it would entirely stop vegetation, and where a heap was suffered to lie but a short time, would, like the lime in Pennsylvania, cause the spot, on which a load is laid, to be two or three years entirely bare, this lime was generally used on winter grain, and harrowed in at the rate of from twenty to twenty five bushels per acre, and in the spring the land was seeded with grass seeds.

The rotation of crops on this light soil,† was fallow, dunged with from ten to fifteen cart loads per acre,

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* This lime, from the colour before burning, appeared as if mixed with sand, and though in a climate as congenial for farming, as any part of Yorkshire, yet the soil is so stiff, dry and unfriendly to vegetation, that its average produce is very little, compared with the other parts of the country.

† Soil a light loam on a hungry gravel scarcely any where deeper than four inches, and a great deal two and an half or three.

of farm yard and stable dung, seeded with turnips, between the 10th and the 15th of sixth month, and sold at from three to five guineas per acre, to dealers who bought the large Lincolnshire sheep, weighing generally from 26 to 36 lbs. per quarter, to eat off the turnips in winter; and in the spring, ploughed very shallow, and seeded with barley, either drilled with two bushels per acre, or if sown broad cast from three to four; the produce generally six quarters or 48 bushels, Winchester measure, (which is common measure through the West Riding of Yorkshire, as is also the statute acre) with the barley, clover seed, or else the spring following peas and beans: the clover was mowed twice, ploughed in and seeded with wheat, the average produce 30 bushels, then the wheat stubble was ploughed in for fallow again. For the first 25 or 30 years, clover was regularly sown every round of crops, but it depreciated so much, that during my residence there, it was only seeded every other round, and peas and beans alternately, an evident proof of the necessity of change. On heavy clays, particularly in open town fields where the farmers are obliged for mutual convenience to sow always alike, the rotation is summer fallow, dunged as for turnips, in the fall wheat, clover or peas and beans one year, and again wheat; the average produce of wheat, was from 20 to 25 bushels per acre, first crop; second from 16 to 20; lime was occasionally used as on the light soils.

I remember one curious circumstance; a relation of mine, who was in the habit of using the caustic lime, as we used to call it, (the magnesian not having entered our chymical nomenclature) having thrown in a

greater quantity of land for fallow than common, finding that his dung would not reach over the whole of it, tried what the farmers call stealing a crop, that is, taking one crop more than the common routine, always condemned by good farmers, as a bad practice; but supposing he could balance the want of dung, for one crop, by a coat of lime, he had recourse to it, but it is so many years since, that I forget the quantity used, however he seeded it with oats, but such was the effects of the lime, that scarcely any thing grew on the whole field but thistles, and of those there was an abundant crop, I believe there was not, on the whole, one cart load of straw.

In confirmation of the practice of stabbing hoven cattle, (as quoted by judge Peters from John Wynn Baker,) I will just remark, that I have long been in the practice of it, and always do it with a small pen-knife very sharp at the point, with a sudden push, four inches from the hip bone, and four inches from the edge of the loin, and never use a tube of any kind; the wind rushes out like whistling with the mouth, nor have I found it necessary to use any kind of application to the wound. I performed the operation this spring on a cow that had lately calved, and she is now near calving again, and is as fat and hearty as any cow in my flock. I always stab in the place mentioned, as the paunch is the nearest the outside of any other part, and the paunch is what always contains the malady, as

is evident by the emission of its contents through the orifice, with great force.

With best wishes for the success of so extensively useful an institution,

I remain, thine sincerely,

JAMES ECROYD.

DR. JAMES MEASE,
Secretary, Philad. Agric. Soc.

On Cyder making, by Henry Wynkoop, Esq. in a Letter to Joseph B. M'Kean, Esq. Member of the Philadelphia Agricultural Society.

Read May 12, 1812.

Northampton, Bucks County, April 1, 1812.

Dear Sir,

Agreeably to your request, I proceed to afford you a detailed statement, of the whole process of cyder-making, as now conducted on my farm. About the middle of October, we begin to gather the apples, when they are perfectly dry, and lay them down in layers, in the cider house and other out houses on floors, not exceeding two feet thick; where there is space sufficient, thiner will be preferable, for the object is, to promote the ripening of the fruit, and the evaporation of the watery particles. In this situation they are left about two weeks, secured from rain and wet, but exposed to the air as much as possible; early in November, they are again sorted, the rotten ones thrown out, and the sound ground in the mill; the pumice of the common apples is laid in troughs, for 12 or 24 hours, having regard to the state of the weather: this tends to sweeten the juice and greatly improves the cyder. As to the Virginia crab, I have not discovered so great a difference, whether the pumice is pressed from the mill or left to lay some time; the remainder of the process will be exhibited by answering the questions proposed to me in your letter, viz.

Query 1*st.* What is the best construction of a mill and the least expensive, to grind the apples?

Answer. The best and least expensive mill I know of, is that of two nuts standing perpendicular, with a sweep fixed to one of them, and formed so as to take the apple from the hopper, and break it on the end plank of the frame of the mill, and then convey the broken parts to the other nut, so as to effect a double grinding by the two nuts; those of my mill, are made of black walnut, which is to be preferred, both on account of the solidity of the wood and not being so liable to crack and split as those of white oak: they have now been in use for three seasons, and are in as good order as when first made.

Query 2nd. Should the apples be ground very fine, and more than once?

Answer. As to the Virginia crab, it matters not how fine they are ground; the finer all other kinds of apples are ground, the more the particles of the pulp will mix with the must, and the more difficult will be the fermentation: that degree of fineness is therefore to be sought for, that will best promote the expression of the juice, without overloading it with the fine particles of the apples.

The pumice after having been pressed may be advantageously ground over again, for the making of water cyder, which when made of the crab, affords a pleasant table drink, during the winter; but as to making whole cyder from it, the must is too thick to answer any good purpose.

Query 3rd. The best construction of a press,—is the screw or lever preferred?

Answer. Our cyder being made in a house, the screw press becomes indispensable, as the lever would occupy too much space, but were it not for that circumstance, I should prefer the screw press, on account of the simplicity of its construction, the speed and facility of encreasing or diminishing the force, and the greater security from accidents to the men that work it.

Query 4th. How long, and to what degree, should the pumice be pressed; may it not be too hard pressed?

Answer. The object in pressing the pumice, is to separate it from the must; the pressure therefore is to be continued until that purpose is effected, which can generally, by proper attention, be done in six or eight hours: the pressure may be so hard, as to over charge the grooves in the floor of the press, so as to run over and waste the liquor, but I do not conceive that the hard pressure can be any otherwise injurious.

Query 5th. Does not the first pressure produce the best cyder?

Answer. I do not know whether the first pressure is the best or not, only one circumstance I have observed, that the women applying for sweet cyder, to make their apple butter, prefer the last.

Query 6th. Which of the several species of apples is best to make cyder, and the difference in the strength and quality of each?

Answer. The Virginia crab is the best apple for making cyder, within my knowledge: when all other apples are ground, the particles of the pumice mix with the must, and cannot be separated otherwise than by fermentation, a process which, in the variable weather of our climate is extremely difficult to controul,

whereas the crab when crushed in the mill, no matter how fine, the particles of the pulp adhere together, and are separated from the juice, without intermixing with it, so that when pressed, the liquor flows from the pumice as water from a sponge, and to take off those small particles of apple that may have escaped through the straw, or the crevices of the frame, it can be strained through flannel, which cannot be done with any other kind of cyder: until, therefore, some other species of apple shall be discovered, possessing that spongy quality, or some other yet unknown, which shall occasion a preference, the Virginia crab will remain superior, for making good cyder, to all other kinds of apples. As to the strength, I have not the means necessary to ascertain it, and as to the quality, that has been described in the preceding part of this answer.

Query 7th. Is it injurious to mix several species and grind them together, if so, the effect?

Answer. I am of opinion that no ill effects can arise from mixing and grinding together, several species of equal ripeness; but mixing and grinding together unripe fruit with that which is ripe, would induce the acetous fermentation and of course prove injurious.

Query 8th. Do you put the juice to ferment in large vessels, before it is drawn off into barrels, and expose it to the air, till the fermentation ceases?

Answer. We put the juice to ferment into the largest vessels we can get, in which it remains until the fermentation ceases: it is then drawn off from the lees, the cask well cleansed, and then replaced in the same or similar sized vessels, till it is again completely settled, when it is again drawn off into similar sized clean vessels, on the fining, and is not put into barrels before the whole process of fermentation and fining is completed; the juice when put into the cask from the press, is left exposed to the air, until the fermentation begins to decline, when the bung is laid loose upon it, with a gimblet hole by the side, till the fermentation is completed; then the bung is driven in, and the gimblet hole stopped.

Query 9th. How soon does the fermentation commence, in general, and how long continue?

Answer. The commencement and continuance of the fermentation, depends so much on the state of the weather, that it cannot be predicted with any degree of certainty.

Query 10th. How do you ascertain when the fermentation has so far subsided, as to make it proper to draw off into barrels, or other vessels, and what is the consequence of not drawing off at a certain stage of the fermentation?

Answer. By placing the ear, at the bung hole of the vessel, during the fermentation, a certain hissing kind of noise is heard in the liquor, when that ceases, the fermentation is completed, and is then in a proper state to be drawn off, and if then neglected, the particles of pumice that had settled down to the bottom of the cask, will, during a warm or damp state of the weather, rise up again, mix with the juice, and thus produce a second fermentation, which is always acetous and injurious to the cyder.

Query 11th. When drawn off, do you stop the cask perfectly tight, so as to exclude all air, or do you leave a vent?

Answer. When cyder is drawn off and put into cleansed casks, a certain ebullition pervades the liquor, and while that continues, the bung is laid loose on, and the gimblet hole left open until it subsides; when the bung may be closed tight, and the gimblet hole gradually, but not perfectly tightened before the ebullition has entirely ceased.

Query 12*th.* How do you prevent the acetous fermentation or check it if commenced?

Answer. To prevent the acetous fermentation, is answered in question ten; as to checking it if commenced, the only method I know of is to put the cyder on the fire in kettles, to boil it gently, so as to raise the floating particles of pumice into a scum on the surface of the liquor, to be scummed off till the rising ceases, then to be returned hot into the cask, previously well cleansed and bunged up tight; this liquor will afford a pleasant drink, during the months of May, June, and perhaps July, but will not keep good through the summer.

Query 13*th.* Do you fine cyder; if so, at what time, and with what fining?

Answer. We do fine cyder, and the time is, after the ebullition, which succeeds the second racking is completely subsided, we then draw off some gallons of cyder, proportioned to the quantity of cyder to be fined, into some vessel, to this we add of isinglass, pounded and unraveled into shreds, about two ounces to the hogshead, containing 112 or 115 gallons, the liquor with the isinglass, is frequently stirred up for three or four days, so that it is completely diluted into a thin jelly, it is then strained through a fine hair sieve,

and put into a well cleansed hogshead, which is filled with the fermented cyder.

Query 14*th.* Do you rack the cyder, if so, at what times, and how often?

Answer. We rack the cyder for the first time, soon after the fermentation has ceased, a second time, soon after the ebullition of the first racking has completely subsided; the third time, when drawn off to be put on the fining; the fourth time, when drawn off from the lees of the fining; the fifth time, when the consequent ebullition has again completely ceased, and the cyder has lain perfectly still for eight or ten days, when it may be drawn off into barrels, so that drawing from the barrels into bottles may be counted a sixth racking.

I am, dear sir,
Your obedient servant,
HENRY WYNKOOP.

JOSEPH B. M'KEAN, ESQ.

On various Agricultural Topics, by James Ecroyd, Philadelphia County.

Read June 9, 1812.

According to my promise, in my former communication, I again take the liberty of troubling the society with some further remarks on a few subjects, already discussed in the Agricultural Memoirs; and though I may not have it in my power, to add any thing new on this subject, yet if by giving a statement of observations of positive practice, for a number of years, I may be able to confirm a good one, or correct any mistakes in attempts to imitate such practices in this country, perhaps they may have their uses.

And as I wish, as little as possible, to encroach on the time of the society, I will first enumerate the different subjects I have at present in view, and endeavour to comprise my remarks on them, within the compass of one letter.

1. On harrowing grain in the spring, and eating it off with sheep.
2. On the diseases of swine.
3. On breeding in and in.
4. On artificial grasses.
5. On smut in wheat.

The harrowing of wheat, is a practice I have seen constantly pursued for a number of years, but most generally on stiff soils, and the effects produced were always considered as highly beneficial; but this operation, was generally preceded by eating off the wheat

with sheep; and this was done by turning on so many as to eat it literally into the ground in two or three days, and so close, that no appearance of a blade could be seen. Partial eating, by too small a flock, was always esteemed rather injurious, by retarding the growth of some more than others, and preventing it from growing and ripening even. If wheat was sown on a rich fallow, so as to be in danger of lodging, the eating it off makes it grow shorter and stiffer, and vice versa; if it be sown on a poor soil, in the spring it looks pale and sickly, and instead of its leaves creeping and spreading on the surface of the ground, it rises straight up and does not stool, in this case the eating it off makes it stool more, mends the colour, and adds considerably to the produce. The method of performing this operation was, after the sheep are taken off, we take a light roller and two light turnip harrows, the width of the roller; these are fastened with chains to the roller, and follow it, the roller breaks and pulverizes the clods, and the harrow loosens the surface and earths up the plants; then both harrowing and rolling are performed at once, with one pair of horses; this operation is always performed in the fourth month, (April) when the ground is dry; it is also practiced on wheat and rye, that is not eat off with sheep, and with equal success; its uses are not altogether confined to the grain crop, as it is the very best method of covering grass seeds.

2. The disease of pigs I allude to, is the complaint first mentioned by J. P. De Gruchy, in his letter, published in the second volume of Agricultural Memoirs. He calls it the staggers, a name very descriptive of the

complaint, as the poor animal's contortions are very violent, running round and round, and frequently tumbling over and squealing violently; and as he justly remarks, it never attacks old hogs, and I believe I may also remark, never attacks poor ones, but such as are in a high state of health and keep; from this circumstance I supposed, that the disorder must be occasioned by plethora and costiveness, and have succeeded completely in curing it, lately, by giving two table spoonsfull of castor oil, and cutting the end of the tail to make it bleed.

3. Breeding in and in.

The subject of breeding in and in, I must acknowledge, has been supported by such respectable evidence, that I feel a diffidence in dissenting from them, but yet, as Judge Peters remarks, "I cannot be so compliant as to abandon the repeated evidence of my senses," and I am confident, that where ever I have seen a trial made of it, that a constant deterioration has taken place; the bone becomes smaller, and perhaps for the second and third generation, the shape rather handsomer, but a continual diminution of size takes place; perhaps however the greatest defect is a want of increase, arising both from barrenness of the ewes, and the lambs being so weak and sickly as to die in great numbers. I saw an instance in Yorkshire, where an old man kept a flock of sheep without changing, till at last, the flock diminished to almost nothing, but coming under the management of a young man, he, by crossing with good rams, in a little time had them equal to his neighbours, almost all the observations I have made on this subject have been on sheep, which,

both from their numbers and value, are kept more select than any other animal.

Another circumstance which always convinced me as much as any other, was this, that take a poor mountain ewe, that would not weigh more than from 12 to 14 pounds per quarter, and cross with a large Lincolnshire or Leicester ram, the lambs would be ready sooner for market, and for the first two months weigh as much as lambs bred from the ewes of the same large breed, though afterwards, the large breed would get the ascendancy. And though it has been the general opinion, that the noted Bakewell, (a man who deserves the thanks of every farmer) always bred in and in, yet during ten years that I lived in Yorkshire, the shape of his sheep was so entirely altered twice, that it was the opinion of intelligent farmers in that neighbourhood, that such a speedy change could only be effected by crossing the breed. One change in particular I will specify: the first kind of them that came into Yorkshire, had very short legs, and broad backs, and were so heavy and clumsy, that in the spring when loaded with wool, they would get over on their backs, and there lie till they died, if not continually watched and turned over. To remedy this inconvenience, in the course of two seasons, the fashion varied, and the rams that were hired were much longer on the legs, and walked loftier, whilst the beautiful small nose and sharp ears were retained, also the general appearance of the carcass, but yet many were of opinion, they could distinctly trace a resemblance with the South Down; this, however, was only conjecture, as at our distance we could only judge by appearances.

The next circumstance I will call the attention of the society to, is respecting cattle; and though it may not be a positive trial, yet it shews the opinion of mankind in general, and in a large district of course may be considered as circumstantial evidence. In the northern parts of Lancashire, where, owing to the extreme of rain and cold, very little grain, except oats, is raised, and being so full of inhabitants, arising from the vast extent of manufactures, as to make the demand for milk and butter almost equal to a city, they are very particular in their breed of cows, and their farms are generally so small, that perhaps there are not more bulls kept, than one in two or three miles, which are let to cows at stated prices, like stallions, and such is the received opinion of breeding in and in, that the owners of the bulls, are obliged to change them every three years, (or they would entirely lose their customers,) that being the age at which they generally let their heifers take the bull. There is also another circumstance, perhaps rather more corroborative than the last. An intimate acquaintance of mine being on a visit to some relations on the verge of Norfolk, where coursing hares with grey hounds, is the favourite rural sport in winter, was invited by a neighbouring gentleman, to partake of the amusement, on a general coursing day; they had about ten brace of dogs brought into the field, and to every hare they started, run one brace of grey hounds; they run so many hares, as to tire both horses and dogs, and if I recollect right, killed about one in four, however he observed one brace of dogs that killed every hare they started, with apparent ease, this excited his curiosity, and on enquiring the cause, he was

told that the gentlemen in that part of the country, who keep such numbers of grey hounds, in order to keep up the strength and swiftness of them, are obliged to cross the breed with large dogs of other species, generally the mastiff or bull, and then by carefully breeding back, nearer and nearer, they gain the strength and fleetness necessary for such sports, and mentioned this as being the case with this brace of dogs.

4. According to my observations, the omitting to seed land with other grasses besides red clover, has appeared to me, one of the greatest defects in the whole system of agriculture in this country. The introduction of it in England, together with that of the turnip husbandry, (and which I believe happened both about the same time, that is, 40 or 50 years ago) has doubled the average produce of England; and though the use of plaster and red clover, have added here so astonishingly to the value and richness of the country, as to make the average produce of grain, in many parts of this state, nearly equal to the best farms in England, yet for want of other grasses, to fill up the vacancy, as the red clover runs out, there seems almost a constant necessity of ploughing every third year, for if the ground by ploughing and fallowing previously to seeding, is put in such a fine tilth, as to destroy all the roots and weeds, the clover the first year is very fine, the second about one half freezes out, and the third, seven eighths, this leaves such a vacancy, as to give room for every weed so noxious to agriculture, blue bottle, garlic, St. John's wort, and a whole host of foes to rise, as to make an almost entire loss for two years, before the native grasses can gain the ascendancy. Besides, ano-

ther circumstance prevents the native grasses from arriving at the perfection they might otherwise acquire, even in good ground, if seeded with the clover, whilst the ground is light and in fine tilth, that by the time the clover runs out, and these grasses begin to grow, the ground is so hard and solid, that one might almost as well expect a good crop of wheat by seeding without ploughing, as these to gain the perfection they might otherwise acquire; and the complaint that farmers make of land binding, would, I apprehend, seldom take place, in ground sufficiently rich, if this method of seeding was once introduced: and I have little doubt but the native green grass and white clover, if a proper method was once adopted for saving the seed, would answer the intention, without the introduction of foreign grasses.

5. *On smut in wheat.* On this subject I will only mention an occurrence that took place about the year 1790 or 1791. A person, of the name of Rodger Trefry, (if I remember right) a native of Wiltshire, came into Yorkshire, with the following proposals; that if 1000 farmers would subscribe one guinea each, to be given him as a premium for discovering the cause and cure of the smut in the wheat, he would make the discovery, and would not ask for the money, till he had fully satisfied them of the fact. Accordingly in the different neighbourhoods through which he passed, he selected such men, as could be mutually depended on, to whom to entrust the secret, as it must take one whole season before it could be proved, they giving their promise of secresy, till the money was paid. A first cousin of mine, with whom I was in habits of intimacy, was the one selected for this purpose in our part, and I had an opportunity of seeing the whole experiment made in a variety of forms: he would take a sample of the cleanest wheat, and after being sown in any situation the farmer chose, it would produce more or less smut ears from every seed, or vice versa, he would take the dirtiest sample, and it should produce wheat sound and good; he did this in a number of rows, drilled in various places, alternately, and all the rows invariably yielded according to his predictions: he accordingly gained the premium, but to what amount I do not remember: the whole art and mystery was this; take a smut ear and pulverize it, mix the powder with clean wheat and it would produce smut, but take the wheat and wash it completely with spring water and it would entirely prevent it.

Case of Croup in a Calf, by Richard Peters, Esquire.

Read, June 9, 1812.

Belmont, May 24, 1812.

Sir,

I was pleased to observe a late request of the society, to be furnished with facts relative to diseases of our domestic animals. You know that my opinion has long been, that the brute creation are afflicted with diseases exactly similar to those to which the human race are subject. To contribute my mite towards the object of the society, in thus calling for information, I mention the following facts.

A few weeks ago, I had a fine, healthy, playful, CALF, suddenly attacked in a manner I had never before observed. I did not notice its extraordinary symptoms, early enough to treat the disease in a mode likely to conquer it. Nor did I conceive soon enough, the nature of its malady. But having some knowledge of the CROUP in children, I was struck, at too late a stage of the disease, with the exact resemblance of the disorder, which had fatally fixed itself in the animal. Its mode of breathing could not be distinguished from that of a child, under similar circumstances. As soon as I was convinced of the nature of the disease, I had the calf copiously bled; and directed *castor oil* to be thrown down the throat, through the neck of a bottle; after opening the passage of the wind pipe with a flexible twig, to which a sponge dipt in sweet oil was attached. It was relieved, surprisingly, for two days;

sucked, and swallowed the milk; which it had not done for several days before. But the disease returned; and continued for four or five days, with restlessness, a cough, and the sharp sound of difficult respiration. It finally died, by suffocation, in a spasmodick, or convulsion, fit. I believe about eight or nine days had elapsed, from the time I had the first notice of the disease. The calf was about a week old, when it was first seized with the disorder. I had it dissected (not very neatly) by my old farmer. In the wind pipe there was every appearance I had seen or read of in human subjects, victims to the CROUP. The membraneous substance obstructing the inside of the *trachea*, and the coagulated lymph, or tough mucus, which formed a kind of false casing to the *trachea*, and a sort of ill digested greyish *pus*, filled up the passage; and the preternatural membrane, or enlargement of a natural one, was remarkably apparent. There were appearances of inflammation, in one or two places. I intended to have sent the whole of the parts affected to you; and your professional knowledge would have enabled you to have given of them a description, of which I am incapable. But my old farmer conceived my curiosity sufficiently satisfied; and, in my absence cut to pieces the wind pipe, and separated all the morbid parts, for his own amusement. I regretted my disappointment much. It is certainly an inflammatory disease; and in its incipient state should be treated accordingly; with depleting and cooling remedies, among which frequent *bleeding* is essential. After its being fixed, I doubt the efficacy of any remedies. Dr. *Rush* informs me he ha

read of two instances of the *croup* in brute animals; and his son James mentioned one other. I think that of a *colt*, which fell a victim to this disease, or some disorder similar to it. Possibly the practice of *bleeding calves*, to blanch the veal, may prevent the disease appearing more commonly, than it otherwise would. My calf had not been precedently bled.

In a *British* agricultural publication, of March 9th, last, a circumstance is mentioned, of "a *ewe* belonging to Francis Fag, of Enfield, on the night of January 29th, having yeaned a lamb, which, in consequence of the ewe having no milk, died the night following: and in the night of February 16th, the same ewe yeaned another lamb; *has a fine bag of milk*, and *both ewe and lamb are doing well.*" This is mentioned as an extraordinary circumstance, as, no doubt, it is.—My neighbour, Mr. *Thomas Bones*, met with a similar occurrence, in one of his ewes; save that his ewe ejected a diseased and dead lamb. In 18 days thereafter, she yeaned a fine healthy lamb; and both the ewe and the lamb were as well, as if no circumstance of the kind mentioned had happened. Such facts are encouraging to sheep breeders, who may meet with similar disasters; and posterior good luck. Every fact relating to accidents or diseases of our stock, is interesting, in the present dearth of veterinary information. Those who neglect to attend to such facts, deeming them trifling and unimportant, are either culpably careless, or reprehensibly fastidious. Let every farmer and owner of stock, inform of any uncommon occurrences of accidents or diseases in domestic animals, happening under his observation; and a body of facts and

information will be accumulated, which may, by men of medical science, and intelligence on such subjects, be turned to the greatest advantage. It has been always my habit to cause to be opened, and examined, every beast which could furnish instruction, for my own, or the benefit of others, when, on my farms, the animal had died by disease, or accident. Every farmer should follow this practice; and note the appearances, or probable causes, occasioning, or supposed to have produced, the loss of the animal. A knowledge of diseases will point to remedies; and both himself and his neighbours may derive future advantage, from his present misfortune.

Dr. *Rush* informs me that *horses* and *horned cattle* are subject to *Diabetes*.

I have seen, and heard of, a greater number of twin calves, this season, than I recollect to have known or heard of in any season before. Some country people believe, that such circumstances occur at particular periods; and assign causes fanciful and various. I have not heard of more than one or two instances of *twins of different sexes*. Nature in this instance discovers a delicacy, directed by the wisdom displayed in all the works of our great Creator. A female calf, twin with a bull calf, is rare, and is called a FREE-MARTIN. These are generally accounted hermaphrodite and barren. In an English agricultural publication (1811,) I have seen an account of a *Free-Martin* having had a calf. But it is there asserted, that no such occurrence had been before known. The writer requests informa-

tion of any similar fact; if any such fact had ever came to the knowledge of English breeders of horned cattle. I have seen no answer to this request, though the papers in which it was inserted are devoted to agricultural subjects; and have been transmitted to me down to a very recent date. I have not paid any particular attention to such circumstances; although they have not passed entirely unnoticed. I do not recollect an instance of a *Free-Martin* breeding.

Your obedient servant,

RICHARD PETERS.

DR. JAMES MEASE,
Secretary, Philad. Agric. Soc.

On Fiorin Grass, by Richard Peters, Esquire.

Read June 9, 1812.

Belmont, May 30, 1812.

Sir,

I send to you strings of the FIORIN GRASS, brought, at my request, for me, from *Ireland*, by my friend *David H. Conyngham, Esq.* who merits much praise for his attention to an article, which may turn out of great benefit to our country. They are not direct from Dr. RICHARDSON, (of *Clonfecle* in *Ireland*, the original discoverer of the extraordinary qualities and almost incredible product of this grass) but are of the kind cultivated by him. For moist grounds, more especially *marshes, fens, bogs*, and soils of this nature, no grass can be more highly desirable. It will grow in any soil, but thrives best where there is the most moisture. No doubt it will be discovered to be an indigenous plant; and when it is perfected from the strings now introduced, a comparison can be made with those of our country. It is common in all parts of the world; but its qualities have only recently been developed. They were not fully known until Dr. *Richardson* discovered and proved them. A fair experiment should be made; and all prejudice and incredulity should be banished. Success, by a careful and persevering *few*, will soon bring conviction to the *many*. The ship in which the Fiorin came, was unhappily cast away on our coast. The grass, confined in a box and a sack, was wet with sea-water, and so remained for two weeks or more.

Yet the strings retain perfectly the principle of life; under circumstances which would have destroyed any other plant; nor does any feculency or putrefaction appear to have affected them. The misfortune affords a strong additional fact to prove Dr. *Richardson's* assertions in this respect. Weeding and cleanliness are required, the first year of laying the strings; but afterwards it eats out and destroys all other vegetation. Its culture must, therefore, be gradual; and within the cultivator's power to keep it clean. If ten acres will produce of this, as much as thirty or forty of common grass, the pains it requires are well bestowed. In bulk, the quantity produced does not much exceed some other luxuriant grass. But its substance, weight, and nutrition, surpass any thing hitherto known.

It strikes its roots shallow and superficially, like *strawberry* runners; grows from every joint in contact with the earth, and finally mats like a rug. Weeds of various kinds are peculiarly hostile. Shade is not so; for it grows vigorously under trees. I have subjoined an account of its culture; and some facts concerning it.

Yours, very truly,
RICHARD PETERS.

DR. JAMES MEASE,
Secretary of the Philad. Agric. Soc.

Culture of FIORIN, or *Agrostis stolonifera.*

It will be enough, for present purposes, to give concise directions to those who obtain a small number of strings for experiment.

1. Dig a small plat, and clear off all weeds. Rake and level the surface, and thereon lay the joints, cut so as to have an inch or more of the string, on each side; or the runners may be laid or stretched lengthwise, in rows, nine or twelve inches apart, to admit the hoe or hand-weeding.

2. Cover them with mould, or compost, thinly; merely to keep them from being blown off, and to set the joints, so as to ensure their striking root.

3. Weed and clean them when requisite. Next season, they will conquer, with very little aid, all other vegetation. The later the crop, of any year, is cut, the better. The strings or runners are the objects; and not what is commonly preferred in hay. The former in winter remain highly succulent; and can be used to as great a degree of profit, as green grass in summer. They promote milk in *cows*, become healthy food for *sheep*;—ewes and lambs particularly; and are preventives of many diseases; by supplying succulent fodder in winter or spring, when no other is to be obtained. The seed of the panicles will grow; but the progress is more tedious. The *culms** and leaves are of little advantage; though they *may* serve for fodder.

The enemies of this grass have confounded it with *quick*, *couch*, or *knot* grass, than which nothing is more erroneous; as Dr. *Richardson* has clearly shewn. The abundance it affords for winter consumption, doubly compensates for exclusion of grazing, which the growth of the runners indispensably requires.

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* The *culms* are upright stalks, supporting the *panicles* or seed spikes.

A damp piece of ground, and the more so the better, to a reasonable extent; or one in a situation to be watered by a stream, will be preferable; though any other will answer sufficiently. Watering the seedling plants, if the weather be dry, would ensure success in a soil not naturally moist.

The facts and mode of culture, I have gathered from European correspondents of such respectability, that I have not the least doubt of their correctness. Nor have I any doubts of the accounts given by Dr. *Richardson*, and others who have followed his practice, respecting the qualities and wonderful product of FIORIN, in *Europe*. How it will answer here, is yet to be known by experience. The trial is well worthy our unprejudiced exertions, and persevering attentions.

FIORIN seems to be best calculated for grounds, fit only for, and permanently devoted to, grass. Because it forbids alternate farming, and is difficult to eradicate after gaining possession, it has been reprobated by European adversaries, who depreciate its real excellencies, on account of its not falling in with a system of husbandry, for which it may not be proper. But if it will bring into great profit, soils not fit for the plough, it will supersede the necessity of keeping in grass, lands which may be otherwise employed. If it will add most abundantly, to the store of winter forage, and is preferred to all other provender, by horses, sheep and cattle;—other grass lands may be grazed, or placed under tillage, at the pleasure of the proprietors of them. That it will grow well in grounds fit for tillage, I have no doubt; but it seems best adapted

to those on which the plough cannot be employed to the best advantage. In those which can be watered, or even *flooded*, the crops exceed any thing ever experienced from any other grass heretofore known. That six, eight and ten tons to the acre (the first the most common) have been produced, is well ascertained to me, by indubitable proofs. The experiment here, is, therefore, fully justified by European facts; be the result what it may. If *Fiorin* produces even double the quantity of nutritious matter, compared to that in other grasses, on the same space or contents, of ground,—one half of our meadows fit for other branches of husbandry, are released from being devoted to winter-forage; and are added to the fields employed in courses of grain, or other crops, or to grazing, at the will of the farmer.

Any time between March and October, or even November, will answer for laying; but in April, is the best.

The strings, in extensive culture, are merely scattered over the surface, and covered with earth, *lightly;* after due preparation of the ground. The cover may consist of scourings of ditches, or draining-furrows; or part of the vegetable mould of the soil in which the grass is to grow; or of richer earth, or compost. Draining wet swamps, at first, will be proper; but when the grass has taken full possession, no matter how moist the soil remains. It will stiffen the surface of *a bog;* so as to support heavy loads.

In some parts of *Ireland*, the strings are twisted into ropes, and chopped with an hatchet, for strewing.

Sometimes the ropes are buried through the winter. In the spring, they are found in a forward state of vegetation; and thus are chopped for strewing, to great advantage.

In *Ireland* and *Scotland*, they prepare the ground and lay or scatter the strings, any time either in, or between October and March. In mild open winters, and favourable autumns, this may be done here. There is a singular advantage attending the culture of this grass. The dry hay, or rather strings, will vegetate, from the joints, many months after being cut, or housed. The operations may be carried on in seasons, when no other such work can safely be done. Whensoever, even in winter, the frosts admit pulverizing the earth, so as to cover the strings, the laying may proceed. The joints will be ready to shoot at the earliest opening of the spring; and, being hardy, will not suffer by late frosts. This plant endures wet, drought, heat, and cold, with far less injury than any of the *Gramina* tribe. No other grass should grow with it; because *that* will be sooner ripe; and fall and feculate, before the Fiorin is fit for the sithe, or hook.

The cutting and curing the crops are performed in the common mode. But it is certainly more tedious and troublesome to cut, than common grass; and frequently requires the hook, instead of the sithe, in some places. Lap, or grass-cocks of small size, are preferred to larger accumulations, at first. Cocks of size may be finally made, but they must not be tramped or consolidated; and may lay out, if necessity requires, in rain or snow, without injury, for weeks, or even

months. The later, in the fall, the grass is cut, the better. This gives time for the most valuable parts, the *runners*, to grow and encrease in number. Dr. *Richardson* prefers the first or second week in October (in *Ireland*) though he has mown as late as December, or January. Our severer winters forbid such procrastinated gathering the crops. All our crops ripen early; and this grass may be fit to cut here in August, or September, at farthest. Winrows may answer, in the first instance, as well as lap-cocks.

In Europe they find that *turnips*, *potatoes*, *carrots*, or other such food, are unnecessary, when dairy *cows*, or *ewes* while suckling, are fed constantly, on *Fiorin* strings.

It is called *stolonifera*, from the lateral shoots or *stolones*, projecting from the main stem. These become parent stems, and shoot out their *stolones*, till all the surface is covered with a kind of net work; which rises in thickness, and plentifully affords a heavy sward.

I met with a worthy, intelligent, Irish woman (the mother of my neighbour, Mr. *Thomas Bones*) at a time when I had some of the strings of *Fiorin* in my hand. She was highly delighted with them, and recognized at once "her favorite Irish grass;" as she expressed herself. She called it "*flotter grass*." She informed me that it grew, in great plenty, on the shores of *Lough Neagh*. It spreads itself into the Lough, in extensive floating sheets; tied to the shores, by strongly rooted stems. The neighbouring cottagers, at all seasons, in winter most commonly, haul on shore what they require, in great abundance; and carry off car loads for

their cattle. Its joints throw out roots in the water. She called those collections of *Fiorin*,—"floating islands."*

R. P.

July 12, 1812. I find the *Fiorin* in plenty, in my neighbourhood. It grows on my own, and other, farms; and, most commonly, in moist spots. It is found on the sides of roads, gullies, and cart-routes where waters of streams, or rains, have moistened the soil; and it delights in the banks of muddy runs, or ditches newly thrown. I perceive several varieties; some much more succulent, and less rigid, in the stems, or strings, than others. I have strewn the *Irish* strings, or joints, on a low piece of ground; but not sufficiently moist, and I have native plants in the same spot. We shall be thus enabled to discover the best kinds for cultivation. Some of the native plants appear mean and unpromising; some very much otherwise. Whether owing to the difference of species, or the quality of the soil, I know

* My informant is a respectable and venerable woman. She is 85 years old; and enjoys, perfectly, her health and faculties. She is remarkably industrious; and spins the finest thread, either of flax or cotton, I have been accustomed to see. She rides on horse back thirty miles, in less than a day, with no fatigue. Her horse (well known to me) is as extraordinary, as its rider. He is perfectly sound and sure footed. He is a New England horse; and was the saddle horse of the late governor *John Penn*. I think he is now as pleasant a hackney, as he was in his youth; though he is 41 years old, at this time. [May, 1812.]

R. P.

not. No doubt this, like all other grasses and plants, grows best in rich soil, but I have no fault to find with the soil; except its not being wet.

November 5. My *Irish Fiorin* is very healthy; and continues to grow luxuriantly. It holds a great superiority over the native plants; though some of the latter look well.

R. P.

June 10, 1813. I was out of hopes as to my *Fiorin*, of all kinds, in the early part of the spring; which has been uncommonly cold and injurious to vegetation. But now the grass has wonderfully thriven. The *Irish*, still the best. A friend who has recently arrived from *Ireland*, where he paid particular attention to *Fiorin*, gives me much encouragement. He says, for the stage of its growth, it is very promising. The *Irish* strings are, he says, exactly the kind cultivated by Dr. *Richardson*; and advises me to cut my little crop in August. Some of the native grass, he thinks, will equal the *Irish*. Others are very much inferior.

R. PETERS.

WINTER-HAY-MAKING.

To the people of *Ireland*, with whom the adage of "make hay while the sun shines" is often useless, *Winter-hay-making* does not appear impracticable or extraordinary. To us, who are accustomed to clear skies and fine weather, the maxim is useful; and its injunction attainable. I have seen in *Ireland* common hay in large *stooks*, in their fields in January; waiting

for an opportunity of hauling it in for final security. The interior was dry, but musty. The musty smell, though to me strikingly perceptible, was not so to the farmer. The *oats* and *hay*, and frequently the *meal* and *grain*, had, *to me*, a musty smell. I was deemed egregiously prejudiced, when I mentioned the circumstance; though it was indubitably true. It is well known, that, owing to wet harvests, *grain*, in *Ireland*, must be kiln dried, before it can be profitably manufactured. I am satisfied that the insensibility of the Irish people to the musty savour of their grain, is produced by the force of habit, which frequently overpowers our natural faculties; and I do not mention it to their disparagement. I have seen their horses eagerly devour musty oats, far better, in every other respect, than ours; but such as our horses, would, on this account, reject. I perceived a strong taint of the *turf*, in all victuals cooked by that fuel. But *Irish* gentlemen, nice in other matters, could not observe it. Their winter-made hay is, most probably, musty; though Irish horses, or cattle, do not perceive, or dislike it.

In the *Cork grain and meal market*, (wherein I was, many years ago) I had the unlucky curiosity, to taste and smell a great number of samples of *flour* and *grain*. I was not aware of the risk I ran. Finding most of them *musty*, in a greater or less degree, I, no doubt, involuntarily, betrayed symptoms of disgust. The dealers observed it; and before I left the market, the large doors were closed on me. I was a perfect stranger, surrounded by a motley multitude; chiefly native *Irish* women, of thalestrian and amazonian ferocity. I saw that I had brought myself, however innocently,

into a predicament ridiculously unpleasant. Fortunately, a dexterous and sudden thought, furnished a plausible excuse for untoward appearances. I relieved myself, in addition to this, by a forfeit of sundry Irish shillings, to the self created *janitrices;* and amused the main body, by throwing some small coins among them. I retreated with plaudits instead of curses, during the scramble; and, no doubt, escaped some *comfortable* huslings and not a few vollies of *poissarde* rhetorick; in which those *flowery* oratrixes are copiously fluent. I avoided, ever after, any mundungus or smell fungus appearances, or expressions, on this *delicate subject*. I perceived that some *Cork* acquaintances, to whom I related my adventure, not deeming the penance for my heresy sufficient, were not *perfectly* pleased with the handsome retreat I had effected; which really had required some *generalship*. Nevertheless, I had been punished, by fine and imprisonment, in a tribunal whose proceedings are always rapid and summary, for a venial offence.

A very intelligent *American*, lately returned from *England*, favoured me with a visit; and informed me that an *English horse*, kept hungry for the purpose of experiment, utterly refused *Fiorin hay* sent over by Dr. Richardson. An *American* horse alike unused to musty winter-made hay, as most probably this was, would have thus conducted himself.

Having, recently, occasion to write to a respectable citizen of *Massachusetts*, on the subject of *Fiorin*, I stated the foregoing fact, as to the squeamishness of the English horse, and my observations on *Irish* hay and grain; as a mode of accounting for the circum-

stance; which, most probably, arose from the savour, and not any other bad quality of the hay. It seems that I am not singular in the view I took of *Irish* harvests, and their consequences. Yet *we* should not be alarmed, who are not subject to the like misfortunes; and can gather our crops in propitious seasons; with very few exceptions. My fellow citizen of *Massachusetts* writes, on this part of the subject, in the following words.

"Many of your observations relative to the injured "state of *Irish* harvests, occasioned by the excessive "humidity of their atmosphere, I have frequently "noticed myself, I passed two thirds of the year "1798, in the cities of *Dublin* and *Cork*, and in the "counties of *Wexford* and *Limerick*; and have often "expressed my astonishment at the *musty* smell, so "very perceptible (to me) in their *fodder* and grain; as "well as the *insufferable smell and taste of turf*, in their "culinary articles; but more especially in their drawn "butter. They, one and all, denied the existence of "any thing of the kind." He mentions a distinguished *Irish* gentleman, with whom he was well acquainted, and whose candour and freedom from other prejudices he well knew, who joined in the disavowal of any perception of the taste and smell so disgusting to *him*. He might have named many others; for of the candour of *Irish* gentlemen there can be no doubt. But all animals, as well human as others, are subject to the indelible impressions, and the dominion, of inveterate and long continued *habit*. *We* should be ridiculously presumptuous, in affecting to exempt ourselves from this common propensity; which, undoubtedly, strangers observe, while we are unconscious of it. The hospitality of Irish gentlemen, soon extinguishes all minor objections to the fare, it so freely and amply furnishes.*

Whether the musty savour generally taints the hay, grain, or meal, in *Ireland*, in *all* seasons; I do not know. I speak of the fact in 1785, 1786; and my correspondent experienced the like unpleasant tang, in 1798. Nor do we stand alone, in this experience; and that in seasons less remote.

RICHARD PETERS.

Nov. 12, 1812.

CONCLUSION.

Wishing to give every information I could obtain respecting the FIORIN, about which so much has been said and written in *Europe*, I may have been too desultory and prolix, as it regards our publication. The conclusion, in my own mind, is,—that upland-farmers will not profit by this grass, unless they devote to it, parts of their watered meadows; or have swamps, or boggy grounds, intermixed with their farms. This often happens;—and to those the *Fiorin* should be ap-

* I have known many persons here, from habit, fond of our garlicky *butter and milk*; preferring them to all other. The people of some of the islands, (whether owing to a natural, or acquired propensity I know not,) those of *Curracoa* particularly, were accustomed to send orders to *New York* and *Philadelphia*, for what they called "high flavoured" i. e. garlicky butter. Our people in general dislike and nauseate it.

plied; and may so be to great advantage.—I need not add, that the owners of low-lands naturally moist, or wet even to excess, can wonderfully improve them, by cultivating this grass.

I have, (since the foregoing communications were made,) read a well written statistical survey of the county of ANTRIM, in *Ireland;* full of interesting agricultural information; by the Reverend Mr. *Dubourdieu*, an Irish clergyman. 1812. He mentions Dr. *Richardson* and his discoveries and exertions, with great approbation. He gives a clear and concise account of the *Fiorin*, both in its natural and cultivated state; on the borders of the *Lough-Neagh* particularly; where it grows in great abundance. What has been detailed in the foregoing sheets, is confirmed; in all substantial facts. It appears that it will not answer well in dry grounds; unless they can be occasionally irrigated, or flooded. The idea that it can be profitably cultivated in poor ground, is exploded. Bogs, swamps, and wet soils, even those fit for nothing else, are its element; as are the shores of lakes, and rivers, naturally rich and moist. Such situations are generally capable of being occasionally flooded; and are subject to overflows. But these should pass away; either of themselves, or by artificial means. Deposits of sand, or other foreign matter, when floods are frequent, injure the *Fiorin*, in regard to its profitable expenditure, in the manner they affect other grass: but its principle of life, and progress of growth, are not retarded.

As to wet seasons, and winter-hay-making,—we have little occasion of putting to the test, the qualities and capacities of the *Fiorin*. To those who are under

the necessity of extracting this kind of comfort from local misfortune, it is happy, that the subject warrants the facts alledged; in this regard. All provender cured in favourable weather, is, most assuredly, the most palatable, wholesome, and nutritious. But that which will sustain, without injury, circumstances under which other grasses would perish, is certainly worthy of every commendation.

It should be introduced by us, wherever it is proper and practicable, as an important and sure resort, when anomalous seasons destroy our other crops; as well as for its positive good qualities, and profitable uses, at all times.

R. PETERS.

June 18, 1813.

On the Diseases of Sheep, and the similarity in their Nature with the prevalent Complaints of Mankind, by Dr. Petrikin.

Read November 12, 1811.

Belmont, October 7, 1811.

Dear Sir,

My friend Dr. Rush, having been so obliging as to communicate to me a letter (to him) from Dr. *David Petrikin* of *Danville*, in *Northumberland* county, Pennsylvania, containing some information apparently important, on a subject which, in this country, is most lamentably neglected—to wit—the diseases of domestic animals; I extract a part of that letter (dated 1st Sept. 1811) for the information of the society. Any thing relative to veterinary subjects is desirable, in our present dearth of information; but this seems peculiarly worthy of attention; though I have before observed very strong facts proving the similarity of diseases in *horses*, *cattle*, and other animals, with those afflicting the human species; originating in like, or the same causes; and requiring similar treatment.—Whether the symptoms or exact description of the maladies existing at the same time, and in the same place, both in men and the brute creation, are alike, I will not determine.—But I have repeatedly observed diseases appearing to *me* to originate in the same causes, and existing at the same time, in the same place, in our domestic animals and the human species. No doubt this has been observed by others more competent to

turn the circumstance to useful account. And it is very desirable, that those qualified in such subjects, should promulgate both facts and opinions.—Dr. *Petrikin* has set a laudable example to professional characters; who cannot employ their anatomical and medical talents to more advantage, than by exerting them in inquiries of this nature. Some of the most respectable men of their profession in Europe, have deemed the subject honorable to them; and have devoted their acquirements in the medical art, as well as all branches of knowledge connected with it, to the great benefit of their country; by developing the causes and cures of diseases in domestic animals; whereof a most valuable part of the property of all countries consists.

Your very obedient servant,

RICHARD PETERS.

DR. JAMES MEASE,
Secretary of the Philad. Agric. Soc.

EXTRACT.

"The hooping cough has been the prevalent disease in this neighbourhood, since the first of June. It has been very mild, and required medical aid only in a few cases; and in those a free use of the lancet was all that was necessary. There have been a few cases of TYPHUS, within two or three weeks past, on the high hills, about five miles from this place. Blisters, bark, wine, &c. were successful. The persons attacked were under 20 years of age. An inflammatory disorder has appeared among the HORSES in the neighbourhood of

these cases; which is generally mortal, principally from their being generally wrong treated. On the *first appearance of the hooping cough* amongst the human species, *an inflammatory sore throat was epidemic among the horses* throughout this country; attended with loss of appetite, fever, inflammation of the Tonsils, and suppuration and very severe cough. I found that *bleeding* and *purging* was the remedy indicated in the beginning of the disease, or at any time *before the suppuration of the tumors.* But *after suppuration, peruvian bark, steel, assafœtida* and *tar*, were useful; and bleeding, &c. injurious. This disease has been generally called the *throat distemper.*

"I never was more forcibly struck with the similarity of the diseases of the human and brute creation, than last winter; of which the following is a history; from my note book."

"January 12th, visited six patients.—Disease pneumonia—pulse tense and quick;—remedies—bleeding—cathartics, and blisters to breast:—called on a visit to Mr. W. B. Montgomery.—Several of his SHEEP have died of disease. Upon dissection, I find considerable inflammation of the membrane lining the *Thorax;* an effusion of water around the lungs; in one of them the lungs do not appear to be inflamed. In several others the lungs are inflamed; and upon cutting into the substance of the lungs, the cells appear full of a frothy liquid. The rest of the body appears healthy; as also the brain. Examined several alive: SYMPTOMS;—cough,—the falling of both ears backwards,—vertigo;—so that in attempting to walk, they stagger.—Prescribed bleeding and purges of molasses and yeast. January 16th, called to see Mr. Montgomery's SHEEP. Several *had recovered, that had been bled and purged the first day of the disease.*

"The similarity of the diseases is evident; and Mr. Montgomery asserts, that bleeding alone saved one or two valuable half blooded Merino sheep in this disease. The blood was taken by opening a vein near the articulation of the lower jaw. Mr. M. had at the time about 300 sheep; of which he lost about thirty by this inflammatory DISEASE; AND CHIEFLY the fattest of the flock."

I copy no more of the letter; because it concludes with an apology to Dr. *Rush*, for the trouble given to him by the writer. The society have had the most satisfactory proof, in the excellent lecture delivered by Dr. *Rush*, and printed in our first volume, that *he* requires no apology; but takes an interest in all such communications of information.—I mention, with not the most distant idea of reproach, but with serious and sincere regret, that, until this communication, we have had no instance of the good effect produced on medical men, by the important example set in that lecture. So that our domestic animals are either, from necessity, placed in the hands of ignorant and fraudulent quacks, and low pretenders to veterinary knowledge, or abandoned to their fate. The latter is, in most cases, the safest alternative.

R. PETERS.

June 20, 1813.

Great numbers of sheep (many valuable *Merinos*) have fallen victims, this season, to the worm in the head. A Tunis sheep of high blood, nor any of its crosses (except in one instance with a *Merino*) never have been known to have worms in the head. The nostril of this sheep is differently formed, from those of common sheep; so as to exclude flies, or other insects. Nor are they subject to mucous defluxions at the noses, in any degree equal to other sheep. It is supposed that the sheep fly deposits its eggs, or worm, in the mucus of the nose; and that by this means, access to the fatal deposit in the head is gained. The passages of the nostrils of *common* sheep, in hot weather, when they breathe violently, are widely distended; and they may inhale, probably, the fly, or their ova. Some repellant of *tar*, or other substance disgusting to the fly, might be applied to the nostril; if this conjecture, as to the cause of the malady, be well founded. It will be highly conducive to the interest of sheep breeders, if both cause and remedy were investigated and communicated. See Mr. *Capner's* account of the worm in the head. Vol. 1. p. 133.

This malady seems to be peculiarly fatal to *sheep*. Whether other cloven footed animals are subject to it, in a degree so destructive, I know not. *Deer*, and some others of the *Cervi*, have worms in the head; similar to those in sheep. It is highly desirable that some remedies or preventives should be discovered, to save our flocks; which have become, under the circumstances of our country, objects of primary importance.

Worms have been detected in the frontal sinuses of human subjects; perhaps produced by the *ova*, or seminal principle, inhaled. Whether fatal effects have followed, I know not. There is, probably, no animal more subject to diseases occasioned by worms, than is man. Those diseases put on every appearance. Their diagnostics are so perfectly *protean*, that they deceive the most skilful physician. If I should not subject myself to the merited retort, of "*ne sutor ultra crepidam*," I would advise, that doubtful and unknown diseases should be considered, and treated, as originating from worms; instead of being styled nervous affections; or, (according to the fashion of the day,) gout. I think, the chances of cure, would be by far the most favourable.

R. P.

On the Agriculture of England,—on Manures,—Convertible Husbandry,—and Soiling, by Mr. John Lorain.

Read November 10, 1812.

Philipsburg, on the Mushanon, Centre County, Penn. July 21, 1812.

Dear Sir,

Previous to my departure from Philadelphia, I promised you some observations on the alarming apprehensions of a scarcity of bread, which sometimes takes place in Great Britain, and also remarks on any subject considered worthy of attention, which might be presented in the recent settlements of our extensive forests; and unexpected leisure has furnished me with ample opportunity for that purpose.

The remarks on British management are novel, and although the substance of many of the observations made on agriculture, may be found dispersed in various writings on that subject; still, the condensing and applying them simply to the best methods of practice, cannot be considered uninteresting, more especially as the value of grass grounds, do not appear to be clearly understood, either in the procuring, management, or the most advantageous application of them, or their lays to future crops. But here I would wish to be understood, that what I have advanced on convertible husbandry, cannot be considered in any other light, than barely as rough and unconnected hints on the subject, and calculated to claim the attention of those who

are possessed of abilities, clearly and properly to explain this invaluable practice.

How far my observations on the forests and the recent settlements, which have either been attempted or established in them, have been anticipated, is entirely unknown to me. Except what has been published by the president of your society, which I cheerfully acknowledge, has been of great advantage to me, in my researches into the revolutions of nature, and the events that take place among timber, I have seen nothing on the subject.

I am, dear sir, your friend,
and humble servant,
JOHN LORAIN.

DR. JAMES MEASE.

Philipsburg, June 10, 1812.

Dear Sir,

Scanty harvests will sometimes occur in every country, and when they take place in Great Britain, to any considerable degree, they excite alarming apprehensions, and seriously affect the tranquillity of the inhabitants, until plenty has been introduced by importation, and a return of more plentiful crops: and as the evil appears to originate in the prevailing partiality for old pastures, and the methods pursued in laying them down, some observations on that subject may be interesting.

The immense advantages which the agriculture of Great Britain derives from an abundance of grass, has been too generally attributed to the superior management of their grass grounds; when in fact the produce

and profits of those crops are greatly diminished in consequence of their management, and their grain and other crops are deficient from the same cause.

When Britons became agriculturists, the grasses which had supplied their cattle while they were shepherds, were ploughed in proportion to the extent of their cultivation, until it became necessary for art to assist nature in the multiplication of grass grounds. It is probable, that at that period, they introduced the injudicious practice of forming pastures from seeds indiscriminately gathered from hay lofts, without reflecting, that by this means they introduced late and early, good and worthless plants, with all the intermediate qualities between those wide extremes, together with innumerable weeds: and it appears strange, that the enlightened agriculturists of that country should still persist in the same mode, with little deviation, although they are frequently disappointed in accomplishing that object, after much labour has been expended, and the income from the grounds are either lost, or considerably curtailed; and after all this expense, to procure permanent pastures, they are frequently indebted to nature, aided by expensive extra manurings, to cover their grounds with grasses; some, after being frequently disappointed, have even encountered the enormous expense of covering the ground with sods, procured from lanes, road sides, and other places.

Although the agriculture of Pennsylvania is in general inferior to that of Great Britain, yet there are improvements in this country worthy their attention. The Pennsylvania farmer selects his grass seeds from the most approved plants: no unknown mixtures are admitted: they are gathered, threshed, cleaned, and kept separate, and by this means we are in possession of the best plants that have as yet claimed our attention; and those who are in the habit of attentive observation, are acquainted with their different properties, except the relative value of each in fattening cattle, a point that has been too little considered, either here, or in any other country, although there are some plants infinitely superior to others for that purpose. If those were known and cultivated separately, much less ground would be found sufficient to fatten an ox, than is at this time necessary for that purpose. Indeed there are few questions equally interesting to the farmer, or that can be more readily determined, than the fattening properties of grasses, especially in England, where they have easy modes of weighing cattle, and can readily ascertain what they have gained or lost, in any given space of time. But not only the knowledge of the fattening properties of grasses, that may be obtained from the separate collecting of grass seeds, but all the different properties of the various kinds of grasses may be thereby understood, such as those best calculated to increase the quantity of milk, butter or cheese,* and to give additional value to their flavour. Useless plants may also be eradicated, and the space they

* The possibility of attaining these objects has been rendered probable, by the sudden change in the taste of cows' milk, from feeding a short time on *Fiorin* grass. See Archives of Useful Knowledge, vol. 2, p. 275. Farmer's Magazine, Edinburg, March 1812, p. 12.

J. M.

would occupy may be filled with other plants, that spring early, and continue growing through every season, until frost has locked up the powers of vegetation. By this means also, grasses suitable for every soil and climate, may be obtained, and the fruitless labour of endeavouring to establish such as are not congenial with either, avoided. Finally, farmers may in this way, as readily become acquainted with the grasses best adapted to their different fields, as they now are with the best grain, roots, &c.

Although the abolition of naked summer fallows, has unquestionably introduced an immense improvement in the agriculture of Great Britain, there can be but little doubt, that the abolition of old grass grounds, and the methods of laying them down, would introduce much greater improvement, the extent of which will be found incalculable: for many of the plants growing in them, ripen late in the season, others are very diminutive, or are not relished by any kind of stock; all those, as well as innumerable weeds, which too generally take possession of a considerable proportion of old grass grounds, may be eradicated by a well conducted system of convertible husbandry; and grounds which have been recently laid down, in a high state of cultivation, with good grasses, suited to the soil and climate, will yield at least double the income which could be obtained from the same grounds, had they continued in old pasture.

The land holders of Great Britain would have long since seen the value of convertible husbandry, had not their judgments been blinded by the imaginary value of their old grass grounds, for they consider submitting them to the plough, little less than a sacrilege, and it appears that the opinion is not confined to men of contracted sentiments, for the board of agriculture, in that country, (who, when influenced by the alarming apprehension of scarcity, which not very long since took place,) were induced to make an extensive enquiry into the expediency of ploughing up old pastures, and after a course of crops returning them back again to grass, appear to have confined that enquiry so pointedly to the ultimate design of returning the grounds back again to permanent pasture, that information in any other shape was rather too much discouraged. Had the board simply requested information on the best measures which could be pursued, to introduce, at all seasons, a sufficiency of grain and other crops, suitable for the consumption and comfortable support of the nation, without diminishing an ample supply of food for live stock, the subject would have been left open, and it is probable, the practice of convertible husbandry would have been recommended by some cultivators, who appear from their writings to understand the value of that practice, although they have not considered it advisable to recommend it, being confined by the questions of the board, or probably deterred by an apprehension, that popular opinion was too much opposed to the practice, to admit any hope of attention being paid to their advice.

When grounds become matted with the roots of old grass plants, it does not appear reasonable to suppose them capable of producing crops, that will bear any tolerable comparison with those gathered from grounds of equal quality, which have been recently

laid down, with the best artificial grass seeds; for the roots of those young plants are healthy, and vigorous, and capable of pressing forward, in search of nutriment, through a soil, which, being free and open, admits a ready passage for them in every direction, and if those grounds are ploughed up, before they become bound, or consolidated, and while the roots of the grass still remain vigorous, and filled with sap, they possess powers of exciting and promoting future vegetation, far beyond what has been generally supposed; for although their effects would be trifling, were they extracted, heaped, and decomposed, previously to their being applied to the crop, they are immensely powerful, when their fermentation and decomposition take place in the soil; for the soil is warmed, moistened, and expanded, in due proportion to the quantity and quality of decaying vegetation, which it contains: this subject is well understood in Great Britain, when applied to clover lays, which are there very judiciously managed, but their old grass grounds are seldom ploughed, until they become so consolidated, and infested with destructive grubs and other insects, that the labour and risk, necessarily attached to the first crops, which are grown on those grounds, render them very expensive, as well as precarious; and it sometimes happens, that two seasons are wasted in cultivating them, before the firm texture of the soil, and the enemies with which it was infested, are subdued. It appears, therefore, that old grass grounds are incapable of producing as luxuriant crops, either before or after they have been broken up, as might have been procured from the same grounds, under a system of

well directed convertible husbandry, and that grass may be justly considered, not only nature's grand restorative of the soil, but also the pabulum of succeeding vegetation;* thence it should be laid down as a maxim in farming, that no grounds should continue in grass until they become hard, bound, or consolidated, and the roots become old and matted, and that the plough should be stopped, before decaying vegetation has been reduced to actual soil or earth, for great crops of grass can be no longer obtained, than while the soil continues free and open, and the roots remain unimpaired, neither can superior crops of grain be expected, after decaying vegetation ceases to stimulate and open the soil, without the aid of frequent manurings.

As manure is a very expensive article, whether purchased, or made on the farm, the judicious application of it becomes highly important to the farmer; and as gentlemen of considerable agricultural information, have differed very widely in their sentiments on the time and mode of its application, it may not be improper to state what has been my practice and observations on it.

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* That grass acts with amazing energy, in both those ways, is readily conceived, by considering that the tops shelter and defend the soil, and also gather and confine the nutritious properties, with which the surrounding atmosphere is charged, until they are conveyed to the earth; the dropping of the leaves are also an addition to fertility, and the tops fed away to cattle, procure manure, and the roots fill the soil, in every direction, with a profusion of vegetation, which, when they decay, enrich it, and most powerfully excite the growth of succeeding crops.

I have invariably applied my farm yard manure, to my summer fallow crops, which have ever been far superior to those who have pursued a contrary practice, and the wheat, barley, and grass crops, grown after those summer fallows, without any further additional manure, I have ever found fully equal, and frequently superior, to the crops grown by my neighbours, who almost universally applied their manure immediately to their wheat and barley crops: and when their fields of those grains were poisoned with weeds, and the grasses sown over them greatly injured, from the same cause, my grain crops were clean, and much readier and sooner harvested, for it was not found necessary for them to stand exposed in the shocks, until the succulent weeds were sufficiently dried, to prevent injury from fermentation, in the stacks or barns, and the harvesting of my grasses derived equal advantage, from the same cause, in quantity and quality.

Leaves, straw, weeds, vines, cornstalks and their roots, were all carefully gathered and used by me, either for littering the stalls or cattle yards. This mode of management produced a large quantity of manure, for as those substances were fully saturated with the moisture of the cattle yards, they formed a valuable compost, without the labour of heaping and turning, and in this situation, previously to fermentation, they were hauled, spread over, and immediately ploughed under the soil designed for my summer fallow crops, which were principally Indian corn and potatoes; and I am well satisfied, that as much ground may be manured in this way by one ox, as could be effected with two, if it is suffered to ferment and rot in the cattle

yards, or heaped up in the fields for that purpose; and if farmers did not suffer their judgments to be biased, either by reasoning, or prejudices imbibed from early practice, their organs of sense would supply sufficient means to determine the subject; for the sight and smell of a fermenting dunghill, would quickly demonstrate the course that should be taken with this invaluable article, for when fermentation takes place beneath the soil, the fructifying and exciting properties of the manure are diffused through the whole mass, and nothing is lost which could have been possibly saved. You have witnessed the rapid improvement, and luxuriant crops which have been obtained on the farm (from which I have lately removed,) by this method of using manure, joined with a regular system of convertible husbandry and soiling, and are capable of judging whether I may with propriety recommend the practice to others. Although a large share of this improvement was obtained by the addition of soiling, yet independent of that invaluable practice, (which, neither the population, capital or inclination of this country appear to favour,) convertible husbandry, joined with a well regulated system of making, saving and applying manure, promises immense advantages; and every grade of soil, from blowing sands, to the most adhesive, cold clay grounds, may be much more profitably managed, as well as sooner improved, through the medium of that practice, than by any other method which has yet been proposed.*

* Well watered meadows, also, grounds inaccessible to the plough, and those subject to land floods or inundations, are excepted.

Cold, retentive clay soils are not so favourable for summer fallow crops, or grain crops, as some other soils; yet even they have been frequently highly improved by that practice in England, and the crops obtained from them were much more luxuriant than they had ever produced before, under the system of naked summer fallowing; and the grass following those crops was infinitely superior to any that had ever grown previously on those lands, and as it clearly appears, that those two wide extremes of soil, are capable of being profitably managed, under a well directed system of convertible husbandry, it will be useless to substantiate the capability of improvement, in the same way, of the intermediate grades of soil;—and although first rate grass grounds, and those near cities or large towns, and superior grazing, and dairy farms, may be all profitably managed in their present state, yet if one fifth part of those lands were annually cultivated, in summer fallow crops, and another one fifth part in grain, the remaining three fifths would produce more grass than the whole, while laying in old pastures or grass grounds, provided the soil was properly cultivated, in regular succession.

The plough, in the hands of an inconsiderate farmer, may be justly considered an instrument of certain and speedy destruction, being capable of exciting the soil to its utmost efforts of fertility, which naturally debilitates and exhausts it, when nothing has been returned to renovate its powers, yet this same instrument, in the hands of a judicious cultivator, who returns back to the soil a due proportion of vegetation, which he can readily gather, becomes the most powerful and rapid

enricher of the soil; for the more effectually it has been excited by this and other implements of husbandry, to produce luxuriant crops, the more food and litter for cattle are obtained, and of consequence, the more manure. Hence we can readily account for the great improvements which have been achieved by enterprising and intelligent cultivators, on exhausted soils. The cause of this is clear, for the strength and vigour of the plants are promoted, and they are rendered capable of extending their roots through the soil, and gathering the nutriment which has been provided in it, for their support, and the tops also of the plants, equally invigorated by good cultivation, extract from the atmosphere with which they are surrounded, the rich nutritive properties with which it is continually charged, and the pulverized and open soil readily imbibes the enriching properties, flowing from the same source, and conveys them to the roots of the plants, with which it has been covered. Why then should the enlightened cultivators of Britain dread the effects of the plough on their grass grounds?

If the grounds which have been very recently laid down in grass, are found too tender to bear heavy stock, they may be either mown, or grazed with lighter animals, and those which are heavy turned on the grasses of longer standing.

When convertible husbandry is properly managed, much labour is saved. A summer fallow crop which will admit of regular horse-hoeing or shimming, is the first which follows after grass, the dung is spread on the sod, and immediately ploughed under, and great care should be taken that it is not turned up, and ex-

posed in the after cultivation of the crop; and for the ensuing crop, ploughing will be useless, as well as injurious, as a fine tilth, with less than half the expense, may be readily procured, without exposing the manure, by means of the scufflers or cultivators, commonly used in that country, which are very similar to the hoe, or fluke harrow used here.

The number of crops taken, before the ground is returned back to grass, should not be many, but must be, in a great measure, governed by the views and situation of the cultivator: if they are exhausting, and more than two are taken, ameliorating crops, as turnips, potatoes, peas, or clover, should intervene, and I believe there are few crops which afford sufficient shade, and produce a plentiful supply of fodder and litter for cattle, and will admit of effectual horse-hoeing, which may not be justly deemed ameliorating, provided a sufficiency of manure has been applied to the soil. Indian corn has ever been my favourite summer fallow crop, for if properly arranged, it affords sufficient shade, and admits the most perfect cultivation, and if the value of the grain, fodder, and litter of this crop is considered, the plant may be justly esteemed far more valuable than any other that has yet been discovered; but it is a large, and very powerful plant, and when grown without manure, and the fodder stalks and roots are suffered to perish in the field, which is too often the case, it becomes a powerful exhauster, and unless it has been planted on grounds recently reclaimed from the forest, or on deep fresh bottoms, its effects on the fertility of the soil are manifest.

Soiling has been practiced with great success, and on a considerable scale, in England, by several gentlemen, whose talents are highly estimated, and they have published very accurate accounts of their experiments, which certainly were worthy much more attention, than has yet been given to them, either in that country, or any where else; for it appears that farmers are the most difficult of any other people under the sun, to be convinced of the errors which are manifest in their practice, or of the utility of the most advantageous improvements, which may be readily made in their profession, and that they believe the knowledge of their art hereditary, for they are immediately up in arms, against any person who attempts to dock the entail of ignorance.

Yours, respectfully,

JOHN LORAIN.

DR. JAMES MEASE.

Observations upon the Agriculture and Roads of the new Settlements in Pennsylvania, with Hints for Improvement, by Mr. John Lorain.

Read November 10, 1812.

Philipsburg, June 28, 1812.

Dear Sir,

In passing westwardly from Philadelphia to this place, I observed with peculiar pleasure, that much attention had been given to grass and red clover, in the older settlements; and that notwithstanding a very imperfect system of husbandry almost universally prevailed, yet great improvement had been effected, and the crops were generally promising, and in many instances very luxuriant: and there can be but little doubt, that the agriculture of Pennsylvania must flourish to a very great extent, even if no further improvement should take place in the general mode of management; for it is very obvious, that as population progresses toward the more recent settlements, an attention to the multiplication of artificial grasses, gradually spreads, and a practice so obviously advantageous, cannot fail of ultimately becoming general throughout the state: and if Agricultural Societies should cease, and enlightened cultivators forbear writing on that subject, still, the industrious and economical farmers of this state must be very opulent; yet if they pursued a better mode of management, improvement and wealth would progress with much greater rapidity, without

either encreasing their own motion, or that of their justly valued stout and fat horses. To effect this purpose, little more is necessary, than to avoid the planting of Indian corn without manure, and also laying aside the preposterous practice of breaking up oat, buckwheat, and rye stubbles, and fallowing of them for wheat; and instead of applying their manure to the latter crop, apply it to summer fallow crops, which will admit effectual horse-hoeing, shimming, or hoe-harrowing, agreeably to the mode mentioned to you in my letter of the 10th instant, on the agriculture of Great Britain.

If I have been properly informed, the road leading through Lancaster, Harrisburg, &c. to this place, would have presented a country for which nature and art has done much more than for that through which I passed; my route laid through Reading and Sunbury, where I crossed the Susquehannah to Northumberland, and followed the course of the west branch of that river, to the big island, where I crossed it again, about 25 miles below Bellefonte. If I am not mistaken, nature has not been peculiarly lavish on the soil of that long range of country, except in the bottoms, which are by no means extensive, and are really trifling when compared with the rising grounds, without taking into consideration the immense chains of mountains, which present themselves in constant succession, after leaving Hamburg, at the foot of the blue mountain; for from that town to the Bear Gap, a distance of about 40 miles, there is scarcely any cultivation to be seen, or a spot on which it could be effected, except the sides or tops of the mountains, or some trivial and

very narrow bottoms, closely hemmed in on each side by them: yet the new turnpike road, through that extensive mountainous country, has been planned and executed with such ingenuity that the ascents and descents are perfectly easy, and without perplexity: the road also is well leveled, with sufficient width for carriages safely to pass each other; and it would have been a model of perfection, if the hardy mountaineers had considered the feelings of their Atlantic brethren, and left the trees and bushes standing on the sides of the road, next the valleys, which, in case of accident, would afford considerable security to the passenger, and would hide from his view the descents into the valley, which are frequently almost perpendicular, and to an immense depth, presenting a tremendous prospect to those who have not been accustomed to the sight: for, notwithstanding the goodness of the road, and full confidence in the abilities and sobriety of the driver, and gentle disposition of the horses, reflections on what might possibly happen, cannot be agreeable until habit has familiarized those grand but terrific objects.

I wish it had been in my power to give you as favourable an account of the improvement which has taken place in the more recent and scattered settlements of the forests, as I have done of those where agriculture has been much longer established, but this cannot be done.—The first object with the settler, is, either to build a cabin or house, and such buildings are much more easily erected, and may be readily rendered more comfortable than is generally supposed: after this object is effected, they fall or girdle the timber, scratch the soil, and commence cropping, which is continued

without intermission, until the fertility of the ground has been exhausted, which renders fresh soil and further clearing necessary, and this new spot also undergoes the same destructive process. Little attention is given to grass, which is seldom seen, except in bottom meadows, and then in but a small quantity, and to those patches of grass all the scanty manure gathered on the farm is hauled on sleds, when hands and leisure will admit of this operation; for it is only the comparative opulent farmer that possesses either waggon or cart, and distant excursions are performed on pack horses, mounted with simple saddles, constructed for the purpose. Here the pride of affluence may be led to depreciate the capacity and ingenuity of those apparently stupid cultivators, but recent serious misfortunes have taught me to feel for the miseries of others, and to participate in the disadvantages under which they labour. I do not observe that those men are deficient in the talents or enterprise requisite for a better mode of management; but that they have been driven, either by folly or unmerited misfortunes, to seek refuge in the forests, without sufficient funds to meet the expenditures, actually necessary to accomplish a better mode of management, and are doomed, by the stern hand of adversity, to deprivations, hardships and sufferings, which could have been readily avoided, had they possessed a capital commensurate with their undertaking. A very inconsiderable sum of money would have rendered them entirely easy and independent, when compared with the funds necessary to form a comfortable and independent establishment, where any considerable population has taken place; for, in

our older settlements, the prices of lands are high, and the fertility of the soil has been so much exhausted by the pioneers, or first settlers of the country, that much labour, and very considerable expense, will be found necessary to restore the grounds to their original state of fertility. But when the agriculturist encounters the forest, he commences on a fresh soil, which has been accumulating the riches of decaying vegetation for ages, and under a proper system of management, and with but very little comparative labour and expense, will continue its original fertility for ages yet to come; a circumstance that cannot fail of insuring independence to well conducted enterprize, although accompanied with but moderate capital, and to those who are wealthy and equally enterprising, noble estates, and to the intermediate grades of capital, proportionate success, provided the plans and expenditures of the cultivator are governed by the true principles of rural economy, a proper system of agriculture is pursued, and a rich soil has been selected. This will not be found a difficult task to the practical, observing, and reflecting farmer, if he does not suffer his judgment to be led astray by the various and erroneous opinions of the inhabitants, on the comparative value of soils,—on which I expect hereafter to make some observations, which, I flatter myself, will not be entirely uninteresting to you.

I am, yours, respectfully,

JOHN LORAIN.

DR. JAMES MEASE.

Observations on the comparative value of Soils, &c. by Mr. John Lorain.

Read November 10, 1812.

Philipsburg, July 12, 1812.

Dear Sir,

In my last, of the 28th ultimo, some observations were promised on the erroneous opinions that governed the settlers here, in their estimation of the value of the soil. This appears to rest too much on the different kinds of timber with which it happens to be covered; for, after excepting influence of climate and an excess of moisture, together with the adhesive, or free open properties of the upper soil, and the next under stratum, (which are both readily seen where the trees have been blown down,) it will be found, if due investigation has been made, that the different kinds of timber with which every soil is covered, have been entirely produced either by the periodical revolutions or changes of nature, or else by fortuitous events; and that the idea of perpetual succession, of the same kinds of timber, on the soils on which they are found, originates in deficiency of observation and attention to this interesting subject. This fact may be readily traced by any observing traveller, who passes through this country, yet men of talents pass through it, live and die in it, and appear to give but very little attention to the subject.

White pine, and spruce pine (or hemlock) cover alike the moistest bottoms and the dryest ridges, for

they appear calculated to grow on any grounds, which are not too poor to afford them sufficient support; but neither those, nor any other timber, are found luxuriant, unless the ground on which they are growing is rich, but there are certainly a variety of timbers, which have not been furnished with properties, to flourish equally on moist, dry, open, or adhesive soils, and on neither of those grounds, whether rich or poor, will timber prevail, which nature has endowed with properties inconsistent with the soil; consequently, those persons who estimate the value of lands, by the kinds of timber which grow on them, may pass by rich lands, and fix on those which are greatly inferior, merely because they happen to be furnished with properties to grow their favourite timber, which now occupies the room of some others, that had previously covered the same grounds.

After those prefatory observations, I proceed to state the leading facts, which have proved, to my entire satisfaction, the periodical and fortuitous changes of timber on the same grounds.

Ocular demonstration clearly discovers, that yellow pines have, at some time, prevailed throughout this extensive country, although they are at present so thinly scattered, in this settlement, that the inhabitants have recourse to their knots for making tar; they are, also, almost exclusively used in place of candles, and when properly fixed in the backs or jams of the fire places, for burning them, and they are properly split and quartered, they afford a brilliant light through the room, without the least offence from smoke. Those knots spring from the heart of the tree, and it is not

until after the rest of the wood has decayed, that they come into use. They are found dispersed on the ground in every direction, through the forests, and are in equal plenty where the soil is covered with timber, whether deciduous or evergreen; and although they claim the constant attention of the inhabitants, for either of the purposes mentioned, and are turned up when they are ploughing, yet it appears, they do not consider, that the grounds which they are ploughing, were once covered with yellow pine. But it is not wonderful, that the distant operations of nature should escape attention, when the changes of timber, within the compass of three or four years' observation, appear to be but little observed by them; yet those men are as capable of reflection as other people, and exercise it too, on objects which they consider combined either with their interest, convenience, or pleasure; but they have not conceived this subject connected with either; and, of consequence, the positive proof of the changes which take place, in the prevailing timber, on the same grounds, entirely escapes their observation, notwithstanding it is readily gathered from the multitude of settlements, which have been attempted, in various directions, throughout the back country, and afterwards deserted by the settlers, either from poverty, or a conviction that the situation was unfavourable to their prosperity, or a restless disposition to ramble in search of some spot, where the efforts of industry, and the unpleasant attention to a persevering economy, are rendered useless.

The grounds thus deserted, either immediately after the timber had been subdued, or after more or less cul-

tivation had taken place, present a truly interesting subject of enquiry, for in every instance, as far as my observation has extended, (and it has been considerable,) the prevailing timber, whether just springing up, or of considerable growth, is found, universally, of an entirely different kind from that which had been subdued. This fact is readily ascertained, by examining the stumps, or girdled trees, which are still standing.

Locust,* which approaches nearer to indestructibility than any other wood which I have observed here, excepting the yellow pine knots, is found lying on the ground, in various directions, where but little traces of them are to be discovered among the growing timber; other varieties having taken possession of the grounds, which were formerly covered with them, and it often happens, in the neighbourhood of Philipsburg, and elsewhere, that when either log-heaps or the timber in general, has been burned, that locust immediately springs up in profusion, where little or no traces of this timber, either dead or alive, had been previously observed.

But here it will be proper to observe, that although no grounds, which are not rich, will be found covered with a profusion of very luxuriant timber, yet fortuitous circumstances frequently occur, which are inimical to the growth of timber, on the best of soils. The huntsmen burn the woods, to obtain a better chance for killing their game, and the inattention of the inhabitants, who kindle fires for various purposes, also spreads devastation far and wide, which has destroyed a vast quantity of timber, where the settlements have been made for any considerable length of time, and where frequent repetitions of burnings have taken place, among the young timber, which had sprung up after the destruction of the old. The consequence has been, that the young plants, from being scorched, have become diseased and debilitated, and appear as scrubby, when growing even on rich lands, as they would have been if the soil was actually poor, and nothing had injured their growth.

* Robinia Pseudo-Acacia. Lin.

After attentively investigating, and duly considering this subject, I have selected my farm, and fixed on ground where white pine and hemlock are the prevailing timber, intermixed with sugar maple trees, and a variety of other valuable deciduous timber, although I might have made my selection from extensive forests, covered with timber of a contrary description. For notwithstanding I do not consider any soil either better or worse, in consequence of the kind of timber which happens to be prevalent on it, at the present time, yet I am persuaded, that after correct investigation has been made of the various advantages and disadvantages, arising from the different kinds of timber, with which the soil may be covered, that lands where white pine prevails, will be found much more valuable than those where deciduous timber is predominant, but as this cannot be demonstrated, until it has been ascertained by well directed experiment, I will state the advantages and disadvantages on each side of the question, leaving every person to determine for himself.

The stumps of white and spruce pines, (which are frequently companions,) stand much thicker and much longer on the grounds, than those from deciduous trees; and the roots from those pines being very numerous, spread very superficially, and present a matted mass of obstructions to cultivation, but by no means so formidable as some imagine, for they are soft and more easily cut, or broken by the plough, than those growing from deciduous timber, and suckers never spring from the stumps or the roots of those pines, neither are the grounds which are well covered by them, infested with grubs, brambles, or weeds: for the very close shade they afford, is unfavourable to their growth, of consequence the stumps and roots of the pines, form the principal difficulties to cultivation. But the grounds covered with deciduous timber, also present some considerable obstacles of the same kind, for open wood lands are particularly favourable to the growth of suckers, grubs, brambles and weeds, and grubbing is expensive before cultivation commences, and suckering and weeding require considerable labour, which must be performed with attention for some time to come.

It is allowed by all with whom I have conversed on the subject, that notwithstanding the evergreen timber far exceeds the quantity of the deciduous trees, on any given space of ground, it is much more readily removed from, or burnt on the lands, being softer, lighter, and more inflammable. The timber of white pine is, moreover, peculiarly valuable in a new country for buildings, which are erected with it in one half the time required by harder and heavier woods; for be-

sides being soft and light, it is straight and free from knots, and of consequence is much more readily cut, squared, and put up; hence a comfortable house, or a convenient barn, is built with an astonishing rapidity of it. The shingles are also very durable, and readily wrought, and the boards exactly suited for every purpose, except the lower floors, and even for those they are by no means a bad substitute for the yellow pine. Rails also, for fencing, are readily formed from this timber, and are only exceeded in durability by chesnut. Hemlock is sometimes used for building, but does not last when exposed to the weather, and of course rails are not split from this wood: but the poles, when used for that purpose, prove by no means deficient in point of durability, when the fence does not lie under the shade, and dripping from the trees.—Hemlock roots generally rot quickly, and the tree falls quite as soon, or sooner, than any other, and for this quality it is less dreaded by the cultivators than the white pine, but it appears that experience has taught them that they sometimes continue sound, and stand much longer on the ground, than usual, and also obtain considerable additional hardness, and, they suppose, proportionate durability, but this has not been tried, neither can I gather from them, with any degree of certainty, the time when those durable trees were girdled, although they believe this effect was produced by the season, when the operation of girdling took place. It appears probable, that this opinion is correct; for the practice of barking trees, while standing, has been adopted in some parts of Europe,

for the express purpose of communicating solidity and durability to the sap wood,* and it has also been found in this country, that hickory, when cut and barked with the sap in full flow, becomes very useful and lasting for the inside work of barns, and is never injured by worms, although generally more subject to their depredations than most other timber;† and it appears equally probable, that if hemlock is barked standing, the sap will sink into the open pores of the sap-wood of the tree, and communicate solidity to those parts, by condensing within them, instead of spending its powers in increasing the size of the tree, which it would have done, if the tree had not been stripped of its bark; this measure, it is likely, will increase the value of this kind of timber considerably, and bring it into better repute, and much greater demand in our sea port towns, where it is already used for many purposes, and together with the bark, (now much used, and in considerable demand for tanning,) may eventually raise the value of this tree equal to almost any other timber.

The youth of this country are remarkably active, and accustomed to the woods, and are better qualified to bark trees while standing, than most other people. The bark of this tree strips much easier than any other timber that is barked, and will admit the operation in the summer, as well as in the spring.

The value of white pine lumber is too well known to require explanation, and is readily cut and transported, and the quantity which a rich acre of land will produce, is very considerable, and the neat clear profit, arising from the sales, far exceeds what could be obtained from the same surface of soil, equally good, covered with deciduous trees.

* See Darwin's Phytologia, Dublin edition, page 25.

† Domestic Encyclopedia, Philadelphia edition, vol. 2. p. 484.

I am,

Yours, respectfully,

JOHN LORAIN.

DR. JAMES MEASE.

Account of the modes pursued in clearing Land in Pennsylvania, and on the Fences in new Settlements, by Mr. John Lorain.

Read November 10, 1812.

Philipsburg, July 16, 1812.

Dear Sir,

There are but two modes of clearing ground pursued in this county; one is termed the Yankee method, and the other girdling the timber, but those two systems are sometimes intermixed.

When the Yankee system is pursued, all the timber is cut down, burnt on the grounds, and pot ash is made from the ashes; after which crops are either sown or planted without cultivation, except what may be found necessary to cover the seeds at proper depths. For Indian corn, no after cultivation is found necessary, excepting occasionally removing with the hand-hoe some weeds, which will arise notwithstanding the effects produced by the fire, but they are few, and require but trivial attention. Potatoes are hilled up either by the plough or hand-hoe, as may be considered most convenient. One luxuriant crop is generally obtained from this practice, but if the soil is thin, or only middling, another crop worth cultivation must not be expected; but if it is deep and rich, more are obtained before the strength of the ground is entirely exhausted: for the ordeal, or trial by fire which it has undergone, does not as readily penetrate to the bottom of a deep soil, and the whole of its virtues are not destroyed by this barbarous practice. After the burning

has ceased, stumps (from under which the rich loose soil has been burnt,) are seen standing on their roots like spiders, whose bodies are supported by long legs, and clay or gravel appears where a luxuriant soil lately prevailed. It requires but little reflection to determine, that this practice cannot be eligible for those who are determined to continue on the soil, although it exactly accords with the interest and views of the laborious first settler, who makes what are termed "improvements," for the express purpose of selling them to those who do not wish to encounter the forests; for the luxuriant crops which have been obtained by this practice, together with the potash, and advance in the price of the grounds, amply reward the hardy son of enterprize, and with the proceeds, he removes further back, and continues a succession of "improvements" and sales.

When the other method is pursued, the trees are girdled, the grubs removed, and preparatory cultivation takes place; after which the grounds are either planted or sown. The first crop is seldom luxuriant, except when potatoes are planted, or turnips are sown, which generally grow large, and prove productive in fresh grounds, without the aid of manure. Whether Indian corn would prosper for a first crop does not appear, and opinion is against the practice, but it should be a subject of experiment, for small grain is sown too frequently, a practice that lets in cheat and other weeds, together with brambles, and suckers from the roots of the grubs, which have not been entirely eradicated, as well as those from the seeds of locust, and other plants, which frequently prove very injurious to the crops, un-

less removed by hand, an operation tedious and expensive, and seldom well executed; and why Indian corn would not prosper as well on fresh grounds as on those which have been longer cultivated, I cannot readily understand, for it has prospered with me formerly, in that way, but my experiment was upon a small scale and not repeated.

Girdling the timber, though less productive in the commencement of cultivation, appears well calculated to insure the prosperity of the owners of the lands, who wish to continue on them. This operation requires so little labour, that it would be useless to attempt any comparison between it, and that required to cut off and burn all the timber, previously to the commencement of cultivation; for the quantity of ground on which the timber may be subdued by girdling, without breaking in on the other multiplied attentions of a recent settler, is considerable, and fully adequate to all the purposes, which he can justly calculate on executing with his force and capital; and it will be some time, before either the falling of the limbs, or the trunks of the trees, will claim his attention; and then the removal, or heaping and burning them, will come on in slow progression, and the most leisure seasons may be chosen to accomplish this business. If after falling the timber, it is heaped and burnt on the grounds, the ashes, judiciously applied on his fields, will amply remunerate the cultivator for the labour so expended, for few manures will be found more favourable, either to the growth of grass, or grain. The trees too, when they fall, act as powerful levers on their stumps, which they bring up with them, and by this means the stumps

do not stand near as long, as they would have done, had the timber been cut off instead of being girdled, and as it will seldom be found convenient for the cultivator to commence sawing and rafting lumber, until some considerable improvement has been made, and a tolerable cultivation has taken place, his girdled timber may stand on his fields, until he can engage in this business with profit. This is certainly an object worthy of consideration, and although some loss will arise from the continued falling of the timber (when it is suffered to stand until it decays,) on the grain, grass, and other crops, yet I am disposed to believe that the losses from this cause bear too small a proportion to the numerous advantages arising from it, to claim the serious attention of those who impartially investigate the subject. Those who girdle timber never have to cut it down, and this not only saves expense, but the farmer derives great advantage from an early removal of the stumps and roots: yet the alarming appearance of heavy timber, generally induces some, either to purchase where it is lighter, or to commence girdling on the thinner ridges of their farms, without sufficiently considering, that this measure entails on their future industry all the losses arising from cultivating a thin, instead of a deep soil, and in return for this sacrifice, they only save the trivial labour of more girdling, and escape contending with more roots, when both those evils seldom amount to near the extent of labour, which they must necessarily encounter from the extra grubs, brambles, &c. generally prevailing in the less heavy timbered, and more open wood lands.

Those who pursue the Yankee practice of clearing grounds, do not appear to be any better governed by the principles of reason, than the girdlers; for although they prefer grounds which are heavily timbered, it is merely because those grounds are not infested with grubs, bramble, &c. and afford ample combustibles to burn the soil, sufficiently for the immediate growth of luxuriant grain crops, requiring little labour in their cultivation.

The fences of this country are, generally, either the common worm fence, or those constructed with logs. For the former, rails are generally split, but when poles fitted for the purpose are found at hand, they are sometimes used. The log fences are formed of such timber as is readily cut and put up, and are built in a direct line, with the ends intersecting and lying close to each other, where they join, and those ends are supported by short pieces of small timber, split for that purpose; both those fences are good, when they have been properly made, but it is probable the latter are most expensive, although they are considered the cheapest, but they do not calculate the extra whiskey, and other good cheer, introduced on such occasions, nor the labour they are bound to return, when their neighbours have to encounter the same work.

Another kind of fence which is only partially used here, and principally by the indolent, or those who cannot afford time sufficient to put up others, which are considered much better, has claimed more attention from me than any other, for I consider them far the best and cheapest, and exactly calculated for a new

country, where timber abounds, and the population and capital are inconsiderable. They are formed by falling the timber in the line where the fences are designed to be run, and by supplying the deficiencies which will afterwards appear, with the limbs and tops of the trees which happen to have taken too great a spread, from the center of the line of the fence, after which, the residue of the work is completed, from the sound timber which has been blown down, if at hand, or such saplings or trees as are found growing close to the spots where they are wanted. When this kind of fence has been properly built, or heaped up, it is said that even deer do not often pass over them; the reason assigned is, that they will not venture to leap, where they cannot see the spot of ground on which they must land: but it possesses other advantages: 1st. The close texture of this fence excludes all animals from either creeping or breaking through it. 2d. When repairs become necessary, the limbs or trunks of the girdled trees will furnish a sufficient supply for the purpose, until a thick growth of plants has spread themselves throughout the whole length of the fence, by which they will be protected, and also nourished from the decaying of its parts, until they acquire sufficient strength, to form a better and more lasting fence than any other, except those made with thorn. 3d. When it shall be found convenient to remove this fence, the extensive ridge of rich soil which will be found under it, from the decayed vegetable matter, furnishes an immense quantity of valuable manure. Such a fence as this will not occupy more room than

the bank and ditches of a regular thorn hedge, and although they will not be equally uniform and beautiful, yet when viewed by those who duly estimate their utility, and the trivial labour which has been expended on them, they will certainly afford an instance of economical and advantageous management.

I have seen a mode of clearing, since my communication on that subject, which will prove highly beneficial where capital and force will admit it, and where there is no prospect of turning the girdled timber into use until it is decayed. The whole of the timber is fallen in winter, and when it and the earth have become sufficiently dry in the spring, to burn off the brush, chips, and moss, without injury to the soil, the cleared place is set on fire, and the logs are left behind, to be afterward rolled, heaped and burnt, this mode saves much labour in picking, raking and burning brush and grubs, and leaves a handsome dressing of ashes on the land, without injuring the soil: but care should be taken in falling the trees, that they will range side by side, for when they are fallen cross and pile, the fire will not run regularly through the clearing.

When population and a scarcity of timber have rendered live fences necessary, they may be readily made from the abundance of thorn which are found in this settlement, and the country around.

Stone coal abounds in every direction, and there is little question, that ere long this coal will become a valuable article of exportation down the Mushanon, and Clearfield creeks, which empty into the Susque-

hannah; for it lies in large banks near the surface, and is so readily come at, that the farmers on the Clearfield have already began to dig and export it: but in this they are wrong, for this business should not be attempted, until a greater population, and more extensive cultivation have taken place.

Yours, respectfully,

JOHN LORAIN.

DR. JAMES MEASE.

An Account of some Experiment with Sulphuret of Barytes as a Manure, by Dr. Isaac Chapman, of Bucks County.

Read November 10, 1812.

Wrightstown, Bucks County, Oct. 20, 1812.

Respected Friend,

I send herewith, an account of some experiments I have been making with sulphat of barytes as a manure, which I think are worthy of being published. If thou shalt be of the same opinion, thou may publish them in any way shall be thought most proper.

I have not found the sulphat of barytes in my neighbourhood in sufficient quantities to authorise the necessary works for manufacturing of it, although many tons might be collected, and from the best information I can obtain, it might be manufactured, at about 25 cents per bushel; if the matter is made public, it is not unlikely, considerable bodies of this mineral may be discovered, which I believe would be of incalculable advantage to the agriculture of our country.

I send by this opportunity a specimen of the sulphat of barytes, and also a specimen of the sulphuret.

Thy Friend &c.

ISAAC CHAPMAN.

DR. JAMES MEASE.

Finding considerable quantities of the sulphat of barytes in my neighbourhood; and judging from the similarity of it to plaster of Paris, that it might have the same properties as a manure, I some years ago tried some of it, but it had no effect; I attempted to burn some of it in a small furnace, by making a fire of wood under the grate, but when hot, the stones decrepitated, and flew out of the chimney of the furnace in small scales; so that I was discouraged from pursuing the experiments any further at that time.

Last spring, on examining the subject more carefully I found that sulphat of barytes was insoluble in water, from which circumstance I concluded its inefficacy as a manure arose: I further found, that, when made into sulphuret, it was very soluble in water; and after making a sulphuret of a small quantity, I judged, from its sensible qualities, it must be a powerful manure, and concluded to make some experiments with it.

In April last I powdered 24 lbs. of the sulphat, and three lbs. of charcoal, and mixed them well together, had them put into an earthen jar, with a light cover thereon, and put into a potter's kiln and burnt with the earthen ware, where it was calcined sufficiently.

In this operation it lost nearly one fourth in weight, and was converted into a sulphuret, became very soluble in water, and gave out large quantities of hepatic gas, (sulphurated hydrogen) so that it became very offensive in the shop, although a bladder was tied over the top of the jar, and made it necessary to remove it into the garret.

1. In the beginning of May I sowed with the sulphuret a strip of wheat, about three perches in length and three yards wide, in a short time the wheat assumed a much deeper green, than that adjoining, and appeared to grow with greater luxuriance, so that it could be plainly distinguished at 15 or 20 perches distance, and held its superiority until some time in June, when there came a severe hail storm, that cut down all my wheat, and totally destroyed the crop, and spoiled the result of this experiment; however, the young clover felt the effect of the sulphuret, and grew with greater luxuriance than I had ever experienced from plaster of Paris, on the same ground, being a clay soil.

2. About the same time, I sowed about 12 square yards of clover, (a clay soil:) it was a misty day, and with a small sieve, I sifted near a pint on that quantity of ground. In a day or two on examining it, I found most of the stalks of clover, that had grown four or five inches high, and the weeds and garlick, to which the sulphuret adhered, were killed; and nearly two weeks of cool, dry weather having followed, it had an unpromising appearance, but moist weather succeeding, it recovered, grew rapidly, and when mown, gave a greater crop than the adjoining grass that was plastered. The second crop shews the effect more favourable, it appearing to afford double the quantity, and growing with great luxuriance, while that adjoining is small and ripening the seed.

3. When planting corn I put in each of 30 hills, (a clay soil,) about half a table spoonful of the sulphuret, dropped the corn on it, and covered it as usual; it came up well, and appeared to exceed what was plastered. When the corn was harrowed I sprinkled some sulphuret about each hill, and that adjoining was plastered about the same time: that sulphuretted grew the fastest and was of the deepest green.

On a gravelly soil, of a reddish colour, called *red-shell*, I applied on fifty hills of corn when planting, about a tea spoonful of the sulphuret to a hill; which had a very great effect; my tenant who farmed the ground, remarked, when the corn was about knee high, that "it appears as if it had been manured with hen dung, the leaves look greasy."

This corn was of a deeper green than that adjoining, which was plastered, and something larger, and a few hills being left without either sulphuret or plaster, were not half so large, and of a pale yellow colour, when contrasted with the other, and the difference continues to this time (September.)

4. Finding the insects very troublesome in my garden, on the cucumbers, and likely to destroy them, I applied some of the sulphuret on them, and the insects troubled them no more.

In this application some care is necessary, or it will kill the plants, I had some of the sulphuret dissolved in water and corked up in a phial; a small quantity of this I put on each plant, which destroyed them. On other plants I sprinkled some of the powder when they were wet with dew, and it injured them very much; on others I applied the powder when they were dry, and sprinkled some of it on the ground about them, which effectually preserved them from the insect, and did not injure the plants. I may likewise observe,

that the corn to which the sulphuret was applied, was not disturbed by the ants or any other insect.

I think sulphuret of barytes is the most powerful manure hitherto discovered, and wish others to make experiment with it: sulphat of barytes is the heaviest of the stones, metallic stones excepted; rather whiter and harder than plaster of Paris; roughly crystallized, of no determinate form. Any person finding such a mineral, can decompose some of it, and form a sulphuret in the following manner; powder it with about an eighth of its weight of charcoal, put the powder into a tobacco pipe and calcine it in a common fire, by keeping it in a white heat for about a quarter of an hour, exciting the fire with a pair of hand bellows.

What the food of vegetables is, appears as yet somewhat doubtful, but the most probable conclusion is, that, it consists of carbon, hydrogen and oxygen variously combined, but principally of the two first: now the sulphuret of barytes gives out great quantities of hydrogen, combined with a small quantity of sulphur; and as sulphurets are powerful solvents of carbon, and indeed the only true solvents of that substance, yet discovered, the sulphuret dissolves the carbon in the ground, thus we have the two principal ingredients in the food of plants, prepared for their nourishment, the oxygen being easily found in abundance, either in the air or water.

In calcining the sulphat of barytes and carbon, the carbon unites with the oxygen of the vitriolic acid and flies off, and sulphur is produced in large quantities, and in a state very soluble in water, in which state it

acts as a very powerful manure; in confirmation of which, it appears, that some soils in volcanic countries, that contain considerable quantities of sulphur, are very fertile; the same soils, likewise give out sulphureted hydrogen gas, and this gas which is given out in large quantities by sulphuret of barytes, produces much of the deep green in the vegetables to which it is applied, as it is found that those plants which grow in the dark, if surrounded with a small quantity of hydrogen gas, are changed from a white appearance to a green.

There is also reason to believe that the barytes may have some agency in promoting vegetation, as in its pure state it is exceedingly caustic, and when taken into the stomach proves a violent poison, yet when dissolved in the muriatic acid, has been given in some obstinate diseases, with much advantage, particularly the scrophula.

On the Cultivation and Use of the Mangel Wurtzel, or Scarcity Root, by Richard Peters, Esquire.

Read December 8, 1812.

After some intermission of the zeal with which this root had been cultivated in *England*, 20 or 25 years ago, I perceive, in some *recent English* publications, that its culture is again revived and progressing extensively.

It will be seen in the English agricultural papers, particularly those of the *Bath and West of England* Society, about the year 1786 and those following, that much attention was then paid to it; though various opinions were formed. The balance was highly favourable. *Dr. Lettsom* in *England*, was its zealous champion; and in his accounts of it, almost every thing relating to its culture, qualities, and uses, may be found.

In *Germany* and *France*, it has long been held in the greatest estimation. The *Germans* stile it MANGEL WURTZEL, the *French*, DISETTE, the *English*, ROOT OF SCARCITY; and the botanists, of all countries, BETA ALTISSIMA; it being, in fact, the largest species of BEET. It might have been called BETA EXCELLENTISSIMA; for it possesses much superior qualities to those of the common beet. I know it well; having cultivated it, for several years, extensively. I think it far preferable to the common beet, as a culinary esculent. Its bulb, or root, has none of the earthy savour of the common beet; and its leaves are, in many respects, better for the table than *Spinach*, to which, when boiled young, they have some resemblance. But the most essential uses of this root, are those applicable to rural economy. For *cattle*, *sheep*, *and store hogs*, no root, within my knowledge, can compete with it. I have had *horses*, to whom it was grateful and nutritive; though some would refuse it. My *sheep* were remarkably fond of it. The *leaves*, which are very abundant, may be stripped or cut frequently through the season; leaving the heart shoots or leaflets; and the root will thrive the better for the stripping. For *milch cows*, they are superior to any other green herbage; and the quantity afforded by them exceeds that of any other plant cultivated on a similar extent of ground. Those who prefer the soiling system, would do well to try the experiment. I believe good seed may be had of some of the seedsmen; who would, if encouraged, soon have it in great plenty.

European accounts of the weight of roots from an acre, and the almost incredible quantity of leaves to be gathered in a season; would appear exaggerated to those unacquainted with this plant. I therefore forbear to mention them. The greatest produce can be had by cultivating in broad cast; and hand-hoeing. The mode I followed, as hereafter detailed, will not equal in product, what increase of the number of drills, and multiplying plants, either in drills or broad-cast, would accomplish. But I spread over *surface*, and left unoccupied intervals, to bring it into the best order for future crops; and thus to afford room for working with instruments calculated to save manual labour.

I have cultivated *carrots* and *parsnips*, in the field, with great success. Those, with *turnips* and *potatoes*,

to both whereof I have done ample justice, have enabled me, in the same season, to make a comparative estimate between them and the *scarcity root*. My experience was always greatly in favour of the latter. There is more saccharine quality, and of course, more nutrition, in these, than in any other root, within my knowledge. I have long ceased to use either turnips or potatoes for *fatting* cattle or swine. The small potatoes, however, are profitably devoted to *store* cattle or hogs.—A fatting bullock will eat one half his weight of *turnips*, in 24 hours. Of the *scarcity root*, I am persuaded, he will not consume any thing like this proportion.—The greatest portion of the *turnips* passes off in urine. If *potatoes* are applied to the support of stock on farms, it must be by those who have no market near them. The intelligent Mr. *Arthur Young*, has recently given a table of calculations of the value of potatoes, used in *England*, as food for various species of stock. I have it not now at hand; but when I perused it, I was perfecly satisfied, that our *Indian corn* could be more profitably applied to *fatting* either cattle or swine, at the cost, per bushel, of four times his average value of the same quantity of potatoes. Although I decidedly prefer the scarcity root to the potatoe, for the food of cattle, sheep or swine, I do not mean to depreciate this estimable product. But more is expected from it, than I have found justifiable. The same observation would apply in *England*, to the *mangel wurtzel;* which had there its day of rage; and fell into neglect, because too great expectations concerning it, had been held out. I shall avoid saying more than my own experience warrants.—The purity

of the seed is all in all, in this vegetable. Dr. *Anderson*, and some others, reprobated it in *England*, after *one* small experiment. He had not good seed; and so hasty a condemnation was unworthy of *him*, under any circumstances.

I have fed off the *scarcity root*, with *carrots*, *parsnips and potatoes*, through several winters; it is true, without so much attention to measure or weight, as would have been required in a nice comparative experiment. Some of my stock were capricious; and preferred other food to the *mangel wurtzel*. But I have never failed to perceive, that those who were constant (and in general they so were) in their preference of this root, were, undeniably, the most healthy, thriving, and easily kept. Yet none were exclusively confined to this food alone. I have been, sometimes, obliged to *invite* sheep and cattle; by strewing a little meal and salt over the cut, or chopped scarcity roots. But after a few messes, no such inducements were necessary.

Notwithstanding the practical proof I exhibited, I was not able to induce my neighbours (worthy but old fashioned farmers) to follow my example. If, *now*, I have no further success, I shall, at least, have the satisfaction of recording the services I have received from this valuable product. It is certainly worthy the attention of those who embark in the *sheep business* extensively. Vegetable winter, or early spring food, is to them all essential. All animals require a change of food. Let this be introduced as an important variety. If farmers in general would cultivate the *mangel wurtzel* in quantities no greater than their other

concerns would admit, they would find not only its positive advantages, but they could bring to market, more of grain, potatoes, or other articles usually consumed in feeding their stock. Great relief would be had from the leaves, when in seasons of drought the pastures are parched and scanty.

I have observed that the root given to *milch cows* in winter, adds to the richness, more than to the quantity of milk. But its tendency to *fatten* was always perceived. *Boiling* the roots seemed best for milch cows; and appeared to encrease the quantity of milk.

I begun the culture of the *mangel wurtzel*, soon after the close of the revolution war. My information relative to its uses, qualities and culture was obtained from *German* books; put into my hands by some of my friends, who had received them from *Germany*. Accident presented specimens of the seed; and experience directed the selection of the best roots for future operations. Like other products, some kinds are much inferior to others. Those of a rose coloured skin, with the interior solid and white; not laminated and motled, like the common beet, are the best. Our worthy member, *Robert Barclay*, Esq. of *England*, with his accustomed kindness and attention, sent to me a small quantity of the seed three years ago. I found much of its produce inferior in quality; but recognized a few of my old acquaintances. From these and some I procured from *Mr. M'Mahon*, I raised excellent roots, for the purpose of producing and distributing the seed; whereof I now have sufficient plenty for experiments; at the service of those members of the society, or others, who will either cultivate the

root or assist in their distribution. I have had in my recent culture, roots of 10 and 12 lb. In general the good roots may average 4 pounds each. The latter was the average weight produced in my first operations. Many then weighed from eight to twelve pounds. Many were, however, small and not worth preserving for winter consumption. Those bore no great proportion to the whole.

In the latter part of the past summer, a farmer from New Jersey, called on me; and was much captivated by the appearance of my little crop. He discovered a few roots of the last year's crop, which had been carelessly thrown aside, in the spring; and had been a long time exposed in the open air. I found him eating, with apparent pleasure, part of one of them. It was perfectly sound, crisp and free from any wilt, or nauseous or feculent smell, or taste. I know not any other root which would have remained sound and palatable, under similar circumstances. My crop of this year is inferior to that of the last. It was raised in the same spot, (contrary to my own ideas of propriety) in which two former crops had been. The season, too, was not favourable. I have, however, of my late crop, had few, if any roots as pure and genuine, as were those I formerly possessed.

In the autumn, the roots must be housed; or protected like turnips, in conical mounds, in the mode known to every body. I have formerly preserved those destined for immediate use, (in which were included the small roots and cullings,) with a covering of straw or corn stalks. No moisture, or damp earth must remain on the roots, when laid up. They are by no

means delicate; but *they must be dry*, to prevent heating and rotting. Frost injures them; but not more (if so much) than it does the potatoe.

When given to cattle or sheep, they are to be washed and cut, or chopped. I have *boiled* them for pigs; and sometimes for other stock; and they were preferred in this way by milch cows, mixed with a little bran or meal. I have never known any animals reject them permanently; though at first some were shy, and disinclined to feed on them. Most of my stock ate them raw. They are always to be considered as a *winter food*, the leaves excepted. When cattle or sheep have been on grass, they do not eat these roots, or any other, with much relish.

They delight in loamy or sandy soils; and I had them the largest and best, in my *trenched* fields—The depth of loose earth gave room for the tap-root, and its fibres, to penetrate and spread. The soil must be in good tilth, and the richer, the better. Miracles have ceased; and it cannot be expected that sterile land will profitably produce this, or any other crop. Yet they do not require manure, in such quantity as do potatoes; nor are they so exhausting a crop. They leave the ground finely prepared, for any crop. Like many garden vegetables, they grow well in virgin soils. *Cabbages* in new land, have not the flatulency of those in dunged ground. New land *turnips* are best.—They grow in limed land, remarkably fine. So does the *scarcity root*,

CULTURE.

1. Your ground must be deep and well ploughed or dug; cleansed from weeds and other pests, harrowed,

or raked; and in every respect in good tilth; as early in the spring as possible.

2. Mark with the plough, lightly, or by a line stretched where your drills are to be fixed, their distances. Mine were;—1st, two drills, two feet apart, 2nd, a space of three feet, 3d, two other Drills, two feet apart, and thus proceeding, through the whole of your field, or plat.

3. Drop and slightly cover a seed or two, to ensure one growing; then, at the distance of 10 or 12 inches in the drill, dibble in and drop other seed, and thus progress, 'till your ground is filled up.—Every seed throws up three plants. At the time of the first dressing, transplant, (or use for cattle) the extra plants; either where there are failures in the drill, or in other ground. Every plant must stand *single*. Those transplanted are seldom equal to those unmoved. This I find to be the case with all tap-rooted plants.

4. Stir the intervals, when requisite, with a small plough or horse-hoe; and hand-hoe in the vicinity of the plants; to keep them constantly clean. I have a small instrument with multiplied hoes; calculated for drilled carrots, &c. which I used when I cultivated such crops in the field. I have such implements of several sizes and breadths.

5. The roots must grow chiefly above the surface, and if a cup, or excavation be made round the root, the *Germans* prefer it. Cleanliness is all that is necessary while the plants are growing. Not so much labour is required, as that bestowed on corn or potatoes. They may be cultivated in broad cast and hand-hoed; where drilling is not deemed more eligible.

6. Strip, when full grown, the leaves; except those of the crown, or heart. Some cut them (as less troublesome) about two inches above the crown.—It is injurious to cut them too close. In about two weeks (according to season) they may be stripped again. In a large extent of cultivation (two or three acres) the roots first stripped will be ready for another stripping, by the time you have gone over the whole. Strip no more than can be consumed in a day. They wilt, and are rejected, if they be exposed to the sun, air, or rain, for any considerable time.

I have candidly, if even it should be deemed imperfectly, given my actual experience in the uses and culture of this estimable product. I cannot but hope that what I have said will induce *some* of our farmers to make trial of this auxiliary to the comforts and support of their domestic animals.—There seem more enterprize and spirit of improvement, among our husbandmen of this day, than existed at the time of my more extensive cultivation of the *mangel wurtzel* many years ago. A *book-farmer* was then an *out-cast*, in the estimation of too many of our agricultural fellow citizens. The character has not yet acquired complete reputation, though it is regarded now, with *some* degree of complacency. If I have added *practice* to *book-farming;* I trust the former will atone for the *venial sin* of the latter. Yet by transplanting, and naturalizing here, foreign and valuable product and practices, by means of information derived from foreign writers, we gain all the benefits of travel, without its toil, dangers and expense.

RICHARD PETERS.

On Flax Mills, by Mr. William Neill, Delaware County.

Read, January 12, 1813.

16 *Mile Stone, Phil. & Lan. Turnpike, November* 24, 1812.

Sir,

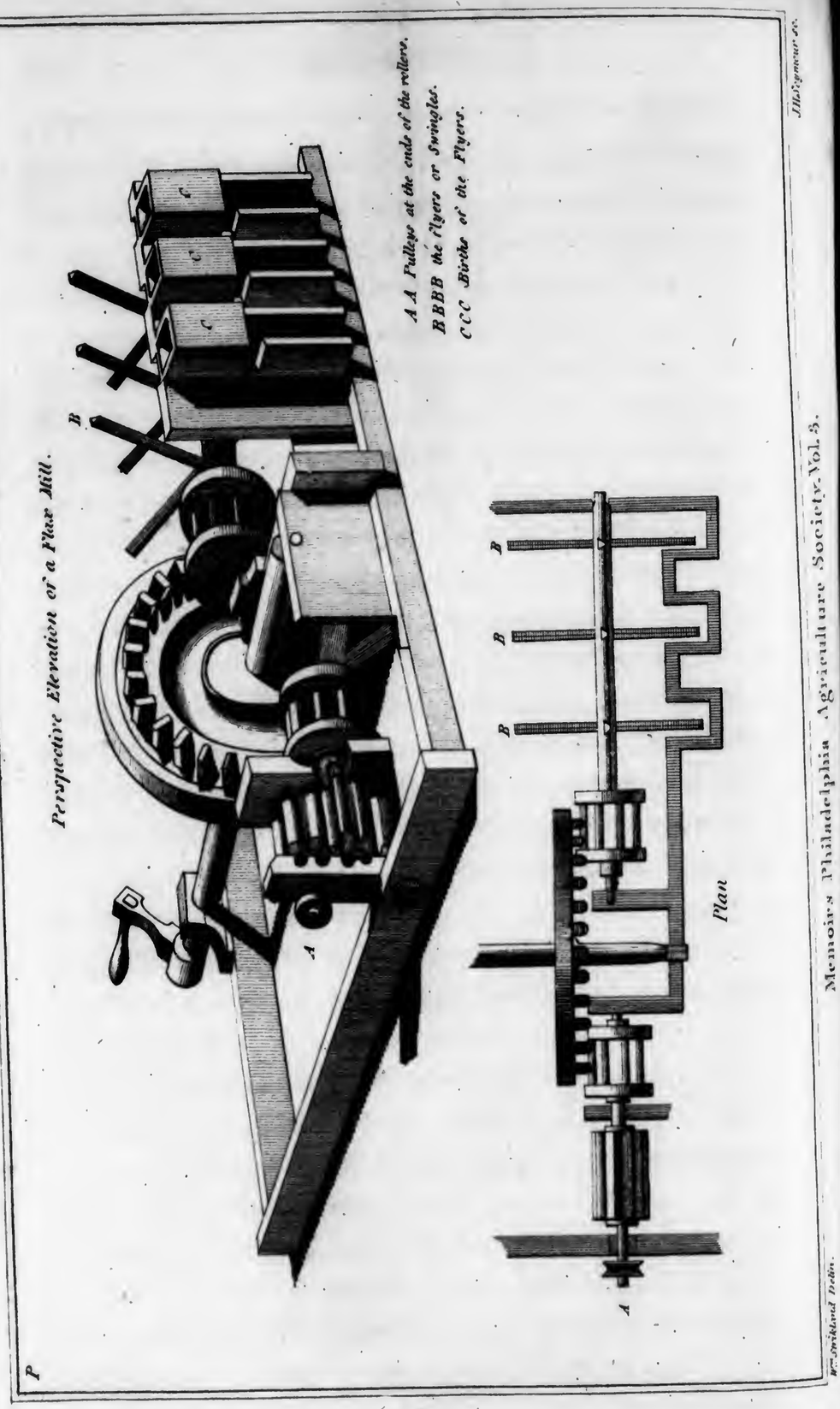
From the progress of our manufactories and the situation of our country, labour saving machinery is daily becoming of great importance.

I have often thought that the introduction of mills for dressing and cleaning flax, would be of great utility in the United States, and had I water on my place, I would have erected one long before this time.

In the north of Ireland they are to be met with every two or three miles, and although labour is there at a very low rate, they have entirely abandoned the mode of dressing flax at home by hand, and send all to the mill, as it is lifted off the ground: when broken and swingled ready for the hackel, it is returned at an expense of six cents, United States money, per pound. The quantity done by a mill in Ireland was from 150 to 220 pounds per day, but that depends much on the quality of the flax, and state of the weather. No mill is more simple in its construction, and less than half the water requisite for a grist mill will be fully sufficient for it, and as all the inside works are light, they can be erected at a very small expense; I think not more than 300 dollars: a mill house of 30 feet by 18 feet, of one story, would be large enough; which with a frame building

to store the flax as it comes to the mill, are all the buildings required. The works consist of a water wheel, a cog wheel, and three sets of flyers on one axle for cleaning. Each set is birthed off with boards to secure the men, and a small space is left between the inside of the births and the ends of the flyers, to hold the flax against them: there are three fluted rollers like the nuts of an apple mill, that work on their sides for breaking. These rollers are best made of apple tree wood, the swingle must be of a wood, the texture of which is close, and not apt to splinter. The swingles have six arms in each stand, but there are only four in the model.

Three men are a full complement for a mill: if they roll and swingle at one time, one of the men leaves his place at the swingles, and attends the rollers: the owner of the flax in Ireland, kept a person to make up the flax in handfulls, and to attend the man at the rollers. In rolling the flax, there is a pulley and a weight fixed to the end of the two extreme rollers, so that they may compress or expand upon the center roller, in proportion as there is more or less flax given in. The flax is put in between the two upper ones, and is shot out between the two under rollers. The rollers and flyers will work independently of one another. I understand it is allowed good work for a man to break and swingle 60 pounds in a week: if he works by the pound he has six cents per pound; if by the day, he will not do so much, so that at any rate he has board and drink over mill price, and allowing two dollars for those, the 60 pounds will cost three pence a pound more than if done at mill, neither will it be so



well done by hand. Men who follow swingling at the mill as a trade, become skilful, and can make the best of any kind of flax; whereas the men we employ in this country are generally unskilful and careless.

The machinery may be attached to other mills. I have seen the swingles attached to other mills, and heard of the rollers being also fixed to them; but I by no means think it prudent in this country, as the climate is dry, and they are apt to catch fire, for in winter our millers work by lamp light, and other mills are very valuable property. Horses or oxen move too slow, and flax mills require a rapid motion. There is a mill in Lancaster county, near the 48 mile stone on this road, and I have seen flax dressed at it, that looked as well done, as any I have seen in Europe: and I am told that the proprietor has more to do than he can perform. The price for preparing it is six cents per pound: three hands dress 180 pounds in one day.

I am, your obedient servant,

WILLIAM NEILL.

THE HON. RICHARD PETERS.

POSTSCRIPT.

I have succeeded in procuring a model of the inside works of a flax mill, by which you will have a clearer idea of the work than by any description I can give. I now send it, and if it can be of any service to my adopted country, I am completely satisfied.

(See the Plate.) W. N.

Account of the Beds of Gypsum, found in the western part of the State of New York, by Jacob Cist, Esq. of Wilkesbarre, Luzerne County, Pennsylvania.

Read January 12, 1813.

Dear Sir,

This very valuable mineral, appears to have been first discovered on the farm of a Mr. Buck, in the town of Sempronius, Onondago co. N. York.—The bed is very extensive, and is composed nearly one half of transparent and chrystallized plaster, termed by mineralogists *Selenite*. Specimens of it have been sent to France, where it has been found equal in quality to the best in that country, for stucco work, for casting of busts, basso relievos, &c.; owing, however, to its inland situation, and the surrounding country being naturally rich and fertile, and but lately brought into cultivation, it is at present not much used for agricultural purposes. From the experiments which have been made with the grey, or amorphous part of it, it is found to be equally as strong as any other.

The second discovery was made in Oneida county, in the town of Sullivan; it is very similar to the Onondago:—the same causes which prevent that being much used also operate here.

It has since then been discovered, viz. in 1806, in Cayuga county, in the town of Aurelius, near the sulphur spring, on the eastern margin of Cayuga Lake; —The quarries here consist solely of the grey plaster, are very extensive, nearly a mile in length, on the Lake;—their extent to the east has not yet been ascertained; for agricultural purposes, this is thought by many who have tried it, to be superior to the Nova Scotia plaster, and it is generally agreed, that its effect on vegetation is earlier perceptible:—the ground where it is found is very uneven, and broken into abrupt hillocks, the timber, fine, thrifty white oak, soil very rich, and the gypsum lies generally so near to the surface, as to be within reach of the pick. Its shistose appearance, the strong marks it bears of having been once worn by the waters, evince that it is a deposition,—and tends to strengthen the theory advanced by the chevalier De Lamanon, of its formation.

The plaster is here dug and delivered at the water's edge for three dollars per ton—the water carriage to Ithaca, at the head of the Lake, brings it to four dollars; from thence there is a portage of 30 miles to Owego, on the Susquehannah, to this point it is brought in great quantities, principally during the winter season, where it usually sells, at 10 dollars;—these prices yield a great profit to the owners of the land, and afford a lucrative trade to all engaged in it. From Owego it is brought down the Susquehannah in arks and on rafts, the former generally about 75 feet long, and carrying about 40 tons, and the latter from 10 to 12 tons. At Wilkesbarre, Berwick, Sunbury, and other places on the river, it is eagerly bought up at 15 and 16 dollars per ton. At all these places, owing to its comparative cheapness and excellent quality, it has entirely superseded the use of imported plaster.

Another bed has been lately found at the outlet of the Seneca Lake; it was purchased in the fall of 1811 by Mr. Thomas Grant, of Sunbury, and opened the

ensuing summer: about 350 tons have been taken from it, and forwarded to the head of the Cayuga Lake. It is very similar to the last mentioned, and has the same outlet to the waters of the Susquehannah.

For some time after the discovery of this plaster, the usual want of confidence, in native productions, caused these beds to be neglected, but owing to the spirited exertions of Mr. John Laning, merchant at Owego, and a few others, in the introduction of it into this state, it has already become a trade of considerable importance. During the summer of 1811, about 1000 tons were taken from the beds, and sent as far as Harrisburg—through the whole of this distance it was much approved of by the most experienced farmers, in the counties of Luzerne, Northumberland, Dauphin, and Lancaster, and during the year 1812, about 3500 tons have been delivered at the head of the Lake, or at Ithaca, chiefly destined for the Pennsylvania market.*

If the communication between the Susquehannah and Delaware was once opened, we should be able to supply Philadelphia with both plaster and coal, in abundance.

This last article alone would be of sufficient consequence to your city, and the country through which the canal will pass, to warrant the expenditure of half a million of dollars;—and when the immense quantity

* During the last year, (1812,) it is calculated that 6000 tons have been sent into Pennsylvania from the vicinity of Cayuga Lake. See annual address before the society of arts of N. York.—By Th. R. Beck, M. D. p. 35. Albany, 1813. J. M.

of lumber, produce and stock, of plaster and coal, which now pass down this river, and the consequent increased consumption, are taken into view, the stock of the canal company cannot otherwise than be very productive.

The advantages of a cheap and excellent fuel, to your city, are incalculable. Why then are not some efforts made to procure this kind of coal from the Lehigh, proportioned to the magnitude of the subject? Is it of less importance than a supply of good water? How many miserable wretches, who shiver over your wood fires, which costs them 6 and 8 dollars per cord, could be made comfortable at half the price? Much of the coal from here is shipped at Havre de Grace, or at tide, for New York, and readily commands 50 per cent. per bushel more than the best Liverpool coal.

very respectfully,
Your obedient servant,
JACOB CIST.

DR. JAMES MEASE.

Specimens of the lake gypsum, and also of coal from the inexhaustible mines in Luzerne county, were sent by Mr. Cist and are deposited in the cabinet of the society. Many of the beds of coal are on the banks of the river. J. M.

Observations on the propriety of a Farmer living on the produce of his own Land, by James Tilton, M. D.

Read February 9, 1813.

Bellevue, (near Wilmington, Del.) Dec. 25, 1812.

Dear Sir,

I have to beg your pardon for omitting so long to contribute to the useful labours of your agricultural society. In return for my negligence, I propose to entertain you with a subject entirely new. Multitudes of writers instruct us how to raise corn, cattle, &c. but I find none, of modern date, who inform the farmer how to live to the greatest advantage, on the produce of his plantation. I shall attempt this interesting subject, with this single apology, that I hope you will not accuse me of vanity or egotism, from the frequent reference to myself, since I declare to you, that my object is to convince my fellow farmers, the opinions and advice I give are as practicable, as they are reasonable and profitable. Indeed, I cannot communicate ideas, that have been strongly impressed upon my mind better,than by interweaving some history of my domestic economy, since I became a farmer; together with the advantages resulting therefrom.

When I resolved to retire to my little plantation of about 60 acres, it was natural to cast about, amongst agricultural authorities, for advice and instruction. As remarked above, I found many to advise me in the production of grain, stock, &c. but Virgil alone how to *eat and drink*. Besides regarding his Georgics as a standard of agricultural science to this day, I was led to consider his Eclogues as recommending agri-

cultural life, from the superior capacity for enjoyment it gave to its votaries, above all other employments; and, at the same time, as recommending it to husbandmen, to avoid the luxuries of the day and live upon the produce of their farms. The beauties of the poet are, in my opinion, surpassed by the wisdom of the philosopher. In that memorable invitation of his friend to supper, hear him sing!

——————— sunt nobis mitia poma
Castaniæ molles, et pressi copia lactis.

The liberal translation we used to give this bill of fare at grammar school, was, we *have mellow apples, boiled chesnuts, and a plenty of curds and cream.* A volume might be written on this single text. I will only remark, that Virgil wrote at the most luxurious epoch of the Roman empire, when the luxury and extravagance of that people surpassed every thing that ever happened before or since; and yet this sage patriot advises, in a manner the most persuasive and delightful, to live on home produce. In his bill of fare no foreign luxury is mentioned, but only the delicious productions of *Mantua*.

Have we not occasion of similar advice in our days? and oh my friend, that we could employ the same influence! for the best classics agree, that Macænas, the proud minister of the powerful Augustus, thought himself honoured by Virgil's invitation.

Independence has been the theme of descant from the days of 1776 to this time. During the revolution, independence of government or self government, as it was emphatically styled, was the rage, from Georgia to Maine. At present, an equal zeal appears for indepen-

dence in our clothing. And, yet, strange to tell, few or none of us think of eating and drinking independently. Is it not a thousand times more ridiculous to send to the East and West Indies for breakfast and supper, than to Europe for clothing? It would seem as if we were so constituted as to admit but one subject at a time, into our heads, and that one of dire necessity. We are compelled to make our own clothes; and Providence may, in compassion to our weakness, by cutting us off from foreign luxuries, oblige us to eat our own better victuals. All good men, like Virgil, will be forward and early in promoting a reformation, equally important in private economy and public policy.

Whatever apology the inhabitants of cities and towns may have, for their obstinate adherence to tea, coffee, &c. surely farmers have none. Their farms furnish much better food, and at a cheaper rate. How then are we to estimate the folly of crossing the ocean at an expense and hazard incalculable, for the sole purpose of indulging in articles universally admitted to be injurious to health and destructive of property? A Chinese would give ten breakfasts of tea for one of milk. An American farmer purchases tea, at great expense, when he might have plenty of milk and other good things for nothing. Which of these characters discovers the wise dictates of native instinct; and which shews us the depravity of infatuation?

But a gentleman farmer, who has plenty of revenues, and may live as he lists and do as he likes, will answer me, that I reason like an attorney on one side, regardless of the good sense and general information of my

fellow citizens. I, in that case reply, that I acknowledge myself an attorney upon one side, and the general information of my fellow citizens; and, therefore, do not hesitate to state my arguments with confidence and energy, against a peculiar infatuation. And if called upon to account for it, I answer; that when we were British colonists, we were forced to be subservient to the lucrative policy of the mother country: we were taught to drink tea, coffee, rum, &c. and to indulge in a variety of foreign luxuries, in subserviency to their carrying trade. They did not encourage the like among their own people. The policy of the British was to favour the use of their own malt liquors and other domestic productions; and to prohibit rum, even of their own colonies: and tea and coffee were dutied and regulated in such a manner, that the use of them was very limited, among farmers at least. They thought it more expedient to send them to us; and would fain have made us pay duty upon them, besides freight and other charges. This gave occasion to our disunion; and considering we had spirit and energy enough to separate from so unjust a nation of merchants, I appeal to the good sense of my countrymen, if it is not very astonishing, that it has never yet occurred to us, to abandon the vicious and injurious habits imposed upon us by mercantile intrigues. It might well have been expected, that we should have felt some resentment at the means employed, as well as the measures of government, for enslaving us. But strange to tell, from the day of our deliverance to this time, we have consumed their teas with apparent delight.

But my plan may be further criticised, by asking, how do you entertain your friends without tea and coffee ? I answer, that I do not own either tea cups or saucers, and yet, I am at no loss to entertain my friends agreeably. My dinner is not very different from that of other folks. Breakfast and supper I eat out of soup plates. Supper is the principal meal of entertainment; and with the best fruits of the season, with and without cooking; bread, butter, cheese, &c. I can make a handsomer display, and furnish a more delicious and salutary aliment than with tea and coffee. Old and young never fail to commend those repasts. It must be confessed, however, the more advanced in years frequently remark, that, however they may now and then relish a feast of this sort, they are very reluctant to relinquish their old habits. But I have the satisfaction to observe, that all my younger brethren and sisters, who are less corrupted by fashion and habit, do not hesitate to declare their willingness to give up their tea and coffee, *every day, for a Virgilian supper.*

But what are the advantages of this Virgilian economy ? I answer, many. In a political point of view, it gives us independence. This requires no demonstration. It also saves many lives; for since my residence at and near Wilmington, more fine young men of the borough have died, in the West India trade, than from any other cause whatsoever.

As to expense, besides the tea and china ware, the time and maintenance of one person about house is nearly saved, from the washing and piddling which these frivolous trinkets require.

In point of health, if you will indulge me in talking about myself, as a familiar example, I will inform you how I have profited, by Virgil's advice. When I resided at Dover, in a flat country and vapid atmosphere, the faculty advised me to *live above the climate.* Besides my meridian before dinner, I generally drank wine in the afternoon. All would not do. I was obliged to fly for my life to this hill country. While I resided in Wilmington, I continued my usual habits. Soon afterwards I was attacked by the gout, and had regular fits for some years. Since I became a farmer and indulged the Virgilian economy, I have never had the gout. For more than 12 years, I have been free from this scourge of intemperance. Although I am now on the wrong side of 60 years of age, my feet have recovered their tone and hardihood; I can walk and ride, and do manual labour as well as ever I could. The trimming of my orchards is an amusement reserved for my own hands: for I would not be hired to let an awkward fellow spoil my fruit trees.—I never learned to reap or mow; but I can shock wheat or make hay with any body. Besides, I am chief gardener in a lot of two acres. My local situation precludes me from extensive professional duties; but such as fall to my lot are not neglected. All this too without self-denial, so great as might be imagined; for although I have quit the use of wine, along with other foreign luxuries, I indulge in a cheering glass of spirit and water, once or twice a day. For this purpose, I prefer good rye whiskey or high proof apple-brandy: for I scorn to go abroad for any thing that I can get better at home.

Are not these advantages worthy of communication to my brother farmers. Is there a man among you, that duly estimates a cheerful and vigorous old age, free from pain and decrepitude, who would think these blessings dearly purchased by taking Virgil's advice, *to live on the produce of his own farm?*

It would take up too much time and space to be particular as to the rest of my family. Suffice it to observe, that if any of them go from home, a few days, they rejoice on returning to their domestic fare; and I have never known a person yet, who had once lived with me, that objected to returning and living with me again, on account of the well known family economy.

By living on the produce of our farms, I would not wish to be understood, as excluding all trade and commerce. Individuals may exchange, and states and nations trade to advantage. But these abstract ideas are very different from the habitual folly of our country. Trade should be encouraged when advantageous; but a commerce that is injurious ought to be repressed. The different states of the union might exchange commodities to great advantage, even in articles of diet. These should be regarded as domestic produce, and ought certainly to be preferred to those of foreign growth. There is a wide distinction to be taken between sending to New England for *cod-fish*, and sending to China for *tea*. The same may be said of bringing *rice* from Carolina, and *rum* from the West-Indies. Having a continent of our own, if domestic commerce were duly cultivated we should have occasion of but few articles from the eastern continents. As no tin

has been discovered in America we ought to import it from England or elsewhere, as we can get it most conveniently. But certainly the importation of iron ought to be discouraged.

You will perceive that I have advocated a general proposition, that of living on domestic fare, in preference to foreign luxuries. Much might be added in detail, on the subject of frugal, healthful and independent living. Your treatise on brown biscuit is an excellent specimen of this sort. Although I commenced the use of biscuit along with my husbandry, you have taught me to make it better than I used to do. My present composition is two parts of ship stuff, and one of common flour. The bakers inform me, a little flour is necessary to the due consistence or tenacity of the dough. Well baked biscuit of this sort, with boiled milk, is my regular breakfast at home. Being always ready, I find biscuit a great accommodation to a family. I commonly break my biscuit in a wooden mortar, which I happened to have for shop use. A friend of mine, who had lost his teeth, took occasion to observe, one day, at breakfast, that he found my mortar the best substitute for teeth he had ever discovered. I mention these little circumstances with a view to remove all possible objections to a form of bread that is equally frugal, healthful and delicious.

Regarding this essay as fundamental on the subject of independent living, if well received by your society, it may give encouragement to numberless details, all tending to shew the wide distinction between good living, and fine or fashionable living: a distinction,

which, if generally and well understood, would be of immense consequence to society at large.

With great respect, I am, dear sir,

your friend, and humble servant.

JAMES TILTON.

RICHARD PETERS, ESQ.
President of the Philad. Agric. Soc.

On planting Indian Corn, by John Steele, Esq.

Read February 9, 1813.

Custom House, Philad. Feb. 2, 1813.

Dear Sir,

Agreeably to request made in your note of the 25th ult. I proceed to give you a short account of the method I have practiced, for several years, in the culture of Indian corn, together with a brief description of the implements employed for that purpose.

I plough the ground, carefully, about six inches deep, after which I spread lime, at the rate of 45 or 50 bushels to the acre, which I mix with the surface, by the use of the common harrow, then mark the ground, with a shallow furrow, for planting, (the corn rows five feet apart,) drop the seed three or four feet from hill to hill, and cover in the usual manner.

When the corn is up to the height of three or four inches, I give each row a stroke with a common harrow, relieving any of the plants that may be covered in the operation, with a small rake adapted to the purpose—when this is completed, or within a few days after, I commence what is generally termed moulding. —This is performed by two strokes, between each of the rows, with what I call a coulter harrow, (its teeth being coulters in miniature,) which completely mellows the ground, by cutting through the furrow, and much closer to the corn, than it is possible with any other instrument I have used, leaving the vegetable surface, turned down in the ploughing, in the same

position throughout the season, which affords, to the roots of the corn, the best soil for nourishment, in whatever direction they may be extended.

At the season of big hilling (in the technical language of Pennsylvania,) I give my corn a similar course, with the same machine, but with small shovels, resembling that of the shovel plough, introduced into the places before occupied by the coulters, when the dressing is ended.

It remains only to give you some description of my corn machine, and to state to you my reason for adopting this method of raising corn, and the consequent advantages.

The frame of my harrow is perhaps no way materially different from that of the common triangle corn harrow; the sides about $4\frac{1}{2}$ feet long, with a spread that places the two back teeth 42 inches apart: the whole number of teeth is seven; the front tooth in the centre, and the other three aside, at equal distances: a light piece of scantling is framed into the sides, in front of the back teeth, for the purpose of strengthening the frame and supporting the handles.—The coulter tooth is about $10\frac{1}{2}$ or 11 inches below the timber, forming such angle with the shank as to give the coulter that direction best calculated to penetrate the ground and perform the office intended. The shovel tooth, below the shank, is about six inches in length, and $4\frac{1}{2}$ in breadth, projecting in that position best adapted for cutting grass or weeds, and generally for cleaning and mellowing the surface. The shanks of each are fitted to the same hole and fastened with a screw on the top: the coulter tooth must be supported with a consi-

derable shoulder behind, otherwise it would be bent back, the resistance being so great as to produce a sufficient draft for two horses:—with the shovel teeth one horse can travel with ease.

The farm, on which I have used this machine, I purchased, in a very exhausted state, about 15 years ago, and designing to improve it with lime, I deemed it of importance to retain the lime (which I have uniformly introduced with corn crop) as much on the surface as possible for the first year. This would not have been the case if the plough had been used; and perceiving that the raising of corn, in the usual way, exposed the soil to wash, my object was to prevent this injury by reducing the surface to a perfect plane, having neither hill nor furrow.

I have uniformly found that the coulter harrow prepared the ground to imbibe and retain a greater quantity of rain water, than in any other way; in addition to this advantage, that a much less surface is exposed to evaporation, than if the land had been ploughed into ridges, which in a season of drought affords a decided advantage; as in the year 1808 I had nearly 40* bushels to the acre, when land of the same quality, in my neighbourhood, farmed in the usual manner, had not half that quantity.

I have tried both fall and spring ploughing and am inclined to prefer the latter, as I have generally found that, by midsummer, the sod was as well rotted in the

* My son informs me that the crop of 1808 exceeded 40 bushels to the acre.

one as the other, and have experienced much less trouble from the rising of grass, than when the ground was ploughed in the fall.

The farm is a thin gravelly loam, with a mixture of clay, and being in a progressive state of improvement, I have not planted corn a second time, in the same field, subsequent to liming—The average crop may be rated at 40 bushels per acre, but with a light dressing with stable manure I have raised sixty. The dung should be turned down in the ploughing.

In order to be somewhat particular in the account I have given you, I may, perhaps, have failed in rendering the description sufficiently intelligible, but you will please to accept it as it is, with my wish that the method I have practiced may be tried by others; as I believe a saving of labour would not only be gained, by its adoption, but also an increase of crop from ten to twenty per cent, and in seasons of drought to a much greater amount.

I am, very respectfully, sir,
your obedient servant,
JOHN STEELE.

RICHARD PETERS, ESQ.

On Trench Ploughing for Indian Corn, and on courses of Crops, by Mr. William Bakewell.

Read March 9, 1813.

Fatland Ford, Montgomery Co. Feb. 25, 1813.

Dear Sir,

I have been in the habit for several years, of trench ploughing for Indian corn. The last summer I was induced at the solicitations of my servant, to try about an acre, by simply ploughing the ground, and planting it in the usual mode. I was much surprised at the difference in the produce of the two parts of the same field; that of the trenched part was at least double the quantity of the single ploughed, and each part had exactly the same culture after the corn was planted.

The mode I use is a *saving* of labour instead of an addition to it. About two weeks before the usual time of planting corn, two furrows are backed upon each other; an experienced ploughman can manage them so as just to meet; but they will be better to fall somewhat short, than to lap over on each other.—At the time of planting I put three horses to the plough, and trench plough the furrow that was ploughed before; a board must be placed between the coulter and the mould-board of the plough, to prevent the soil from falling down, and it will completely cover the seed corn, which saves the trouble of covering it by the hoe in the usual way.

I generally plant about 18 inches distant, and my rows of corn are eight feet apart; a hoe is used to

make a small cavity in the soil in which three grains are deposited, the cavity should not be made very deep as the trench ploughing will cover it effectually.

The planted ground must be looked over afterwards, to see if any of the seed is left uncovered, and some time before the corn is up, the intervals between the rows should be ploughed, or at least one furrow on each side of every row.

The usual course of crops in this neighbourhood is, 1st. Indian corn, 2nd. oats or barley, 3rd. wheat or rye, 4th. clover.—My routine is 1st. wheat, 2nd. rye and buckwheat *sown together*, 3rd. Indian corn, 4th. barley or oats, with manure, 5th. clover or grass seeds, or both. I generally give the wheat two ploughings, especially if there is any grass among the clover. I have sown part of my wheat stubble with rye and buckwheat, (as soon as can conveniently be done after harvest,) and part with rye alone, at the usual time of sowing that grain, and I thought the rye and buckwheat produced a greater quantity than the rye sown alone, and it is a great saving of labour.—Besides, a good quantity of wheat is gained mixed with rye, from the stubble of the preceding year. The proportion of seed I use is one bushel of rye and half a bushel of buckwheat. The buckwheat may be cut at the usual time without any injury to the rye.

I attribute my having as good crops of corn as any of my neighbours, solely to trench ploughing. When the ground has borne *three* crops before, the surface of the soil may well be exhausted. The trench plough brings a substratum of fresh soil to the roots of the corn, and gives the small fibres more liberty to expand. I

also find trenching very good for pumpkins, which I usually grow between my corn, when the ground is not too full of weeds.

I remain, dear sir, yours sincerely,

WILLIAM BAKEWELL.

DR. JAMES MEASE.

Secretary, Philad. Agric. Soc.

POSTSCRIPT.

April 3, 1813.

I omitted to mention that I generally put a handful of two parts leached ashes, and one part hen or pigeons' dung, on every hill of corn; but the chief object of this appendix is to caution any person who follows my system, not to sow the oats too thick when sown with clover or grass seeds. One bushel to the acre is the proportion I commonly make use of.

As barley requires a drier lighter soil than oats, I always sow my barley on the lightest soil, at the rate of two bushels to the acre, and the oats on the heaviest.

As *wheat* is the *golden grain* according to Mr. Arthur Young's definition, I think the ground should not be exhausted by Indian corn, especially when a crop of oats follows it. I had upwards of 500 bushels of wheat from a field of 18 acres last year. I first ploughed the ground six inches deep in August, it was harrowed twice over in September; and the first week in October, the surface of the ground was ploughed as shallow as possible, and sown with wheat at the rate of $1\frac{1}{2}$ bushel per acre.

WILLIAM BAKEWELL.

A short Historical Sketch of Agricultural Improvements in the County of Roxburgh, (Scotland,) with some Account of the means whereby it was accomplished, by Mr. John Lang.

Read, March 9, 1813.

From forty to fifty years ago, the old system of out-field and in-field was universal, with very few exceptions. There were generally no fences of any kind, except a few fields, or parks as they were called, near a gentleman's seat. On common farms, the only fence was a stone wall or dyke, built without mortar, round the barn yard; and in some instances, two or three acres were inclosed in the same manner, near the farm house, called a croft. These crofts were most common in small villages, where the land had been let on ground rent, in lots of a few acres, for building.

There were few or no artificial grasses; their hay was all from natural meadows or swamps. The pasture-ground and fields of grain lay promiscuously interspersed over the farm, without any security from the depredations of the farmer's own cattle, or those of his neighbours, except from the vigilance of the shepherds and their dogs. Thus, though the whole country would have appeared to an American in a state of commons, every man's property was held sacred, and damages were recoverable at law, for trespasses committed upon a neighbour's grain or pasture, &c. That part of the farm which lay most contiguous to the farm house, was termed in-field; upon which portion was put all the manure made upon the farm. This

was divided into five brakes or patches, the rotation as follows: wheat, peas, barley, oats, fallow. The wheat and the barley were always well dunged; and this was accounted a highly improved rotation.—Sometimes oats instead of peas were sown after wheat. Wheat-land-oats, as they were termed, were reckoned good seed for the out-field; seed oats for the in-field were generally purchased from a distant farm, famed for good oats. By far the greatest proportion of the farm was out-field; of this, a patch of unequal dimensions, (being a portion of the oldest pasture ground) was broken up every year, and sown with oats; again ploughed in the fall, and left all winter to be pulverised by the frost, and in the following March, the oats were sown without any more ploughing. This course was pursued for three years successively, and then the land was left to rest, for an indefinite number of years, without any grass-seeds of any kind sown upon it.

Upon those farms where sheep walks were a principal object, little grain was sown in the out-field, and such was the sagacity of the shepherds' dogs, that they would lead the sheep to feed close to the very edge of the growing grain, without touching a stalk of it, and at night the sheep were confined in a pen or fold. These folds, when ploughed out, produced very strong crops of oats, for three years sussessively.

All the land, whether in-field or out-field, was formed into high ridges, the middle of which was raised to the height of perhaps a foot, to a foot and a half, or in some instances two feet, above the level of the furrows between: these had remained in the same form from time immemorial, and were all

less or more crooked, and the bends lay all in one direction, originating from the horses naturally falling off from the land, and so taking a less furrow when they came near the end. The broader ridges required to be sown with four casts, the narrower kind with three casts; the first required four or five reapers, the last always three. Between many of those ridges were banks of three or four feet wide, or more, which had never been ploughed; and the first step towards improvement was the breaking up of these banks. This was no small undertaking, where the soil was a stiff clay, and matted together with the roots of briars, rushes, and grasses, and the horses from being poorly fed were thin and light. The common mode of ploughing was with four horses, two and two abreast, with a boy to drive them: but to plough up these old tough balks it was necessary to put six horses, or two oxen and three horses before them; and notwithstanding, this arduous task was at last almost universally effected. The success which attended this, suggested the idea of another more formidable improvement. This was no less than leveling the old ridges, and laying out their fields in regular form. This was much reprobated, chiefly by the old men, who did not hesitate to predict the certain ruin of whoever would undertake it: and indeed appearances were much against it at first. To level these high ridges required a number of repeated ploughings, always one way, until the hollow between was filled up higher than the other parts, to allow for the settling of the loose mould; the field was then laid out into straight narrow lands, which could be sown with two casts, and reaped with two reapers.

One great inconvenience attended this improvement; the middles of the old ridges were now so completely deprived of vegetable mould, that nothing would grow upon them without being manured, and after all, it was generally three years before the field could be brought to bear so uniformly, but that one could see at any reasonable distance the form of the old ridges, while the crop was growing. This, by industry and perseverance, was at last overcome, and such is the force of example, that the prejudices of the old farmers were at last subdued, and the whole country was finally drawn into the spirit of improvement.

But this leveling system made it absolutely necessary to have manure of some kind; lime could not be had in Roxburgh county, except what was brought at least 30 miles, in any direction; and turnpike roads and carting had but lately been introduced to any considerable extent; yet under all these disadvantages, great quantities of lime were used for manure. Marl was likewise used where it could be had, but this could not be carried with advantage, to a distance of more than two or three miles from the spot where it was found. But even where lime and marl were both employed, the improvement was not considered complete without the addition of dung, and this could not be made upon the farm while the old system of farming prevailed; to remedy this inconvenience the artificial grasses were introduced with great advantage. The abundance of excellent upland hay they made, enabled the farmers to keep a more numerous stock, and the straw upon which their half starved cattle and horses were wont to be fed in winter, could now be

spared for litter; and it was soon found, that one field thus improved produced more grain, &c. than three such fields in their former state.

The rotation of crops was now totally changed, and the distinction of in-field and out-field was no more known: a comparatively small proportion of the farm was now under grain crop, and two grain crops were never taken without an intervening green crop; the greater part of the farm was occcupied with turnips, or with clover, or other up-land meadow, rich pasture, or fallow.

The old Scottish plough, the only one which had ever been used in the old husbandry, was found to be poorly adapted to the new. In ploughing the old, high, crooked ridges, a straight uniform furrow was not absolutely necessary, but upon a level field this was indispensable, particularly where the soil was generally a strong clay, upon a substratum of schistus, through which no water could pass. In this case, the least unevenness would retain the water, and in long continued wet weather ruined the crop. The object now was a square furrow, equal in breadth and deepness, that would stand on its edge, only so much turned as not to fall back.

The first substitute was a small plough introduced from England; which, instead of the round sock, and long narrow coulter, had a flat share, a short beam, a short broad coulter, and a mould board cut to a nice curve, out of a solid piece of wood, and covered all over with sheet iron. This plough was easily worked with two horses without a man or boy to drive; it answered well for a light sandy or gravelly soil, but for a tenacious clay it turned the furrow too much on its back, and in wet weather it was apt to sour, (stagnate) and on such soil, if the weather was inclined to wet at the time of ploughing, the furrow was so nicely smoothed off, that when it became dry it was like baked earth upon which the harrow could take little or no effect. To remedy this inconvenience, another plough was invented by a Mr. Small, for which he obtained a patent. Improvements were from time to time made upon Small's plough, until it was conceived to be brought to such a state of perfection, that no farther improvement was wanted: since that time almost every part of the plough has been made of cast iron.

Ploughing was now learned like a trade, and ploughing matches were instituted, at which premiums were given to the best performers, and such is the perfection to which they at last arrived, that a good marksman, in taking an aim along a furrow, could not see any variation in the whole length of a long land.

While these improvements were going on, it became necessary to have the fields fenced in: where stones were in plenty, stone dykes were used, but the most general mode of fencing was with hedge and ditch; this was greatly facilitated by the extraordinary industry of Mr. Archibald Dickson, who from a small beginning, became famous for being the first who raised nurseries of thorn-quicks, upon the great scale; his sons are well known all over the kingdom. It was common for the landlord to pay out the original expense of fencing in this manner, and charge the tenant five per cent upon the sums so expended; the latter was bound to keep the hedges clean, and trim them as

occasion required. In some cases they were bound not to put any cattle, and more particularly sheep, in such fields, for five years from the time of planting. This was at first a considerable loss to the tenants, but a great advantage in the end.

It now remains to take notice of the means whereby such a wonderful change was produced. It will be readily conceived that the original expenses of such improvements must be very great, before any return could be expected; and besides the long established habits and prejudices which had to be overcome, the farmers were generally so very poor, that it was not without the most rigid economy that they could support their families, and pay a comparatively small rent, so that nothing could be raised from the land in its then state, to meet such expense. Most of the farmers at that time were totally ignorant of the nature of banks, neither could their credit command any money in that way, and there were no banks nearer than Edinburgh, which was from 30 to 50 miles distance. At first, some landlords more liberal minded than their neighbours, put their tenants in the way of getting money at the Edinburgh banks, by giving their names to their notes, and this induced others to follow their example. About this time a branch of the bank of Scotland was established at Kelso, a considerable market town, to which the farmers generally resorted to sell their cattle and produce. Here they formed themselves into clubs, to assist each other with their names, to their respective bills or notes. This business was not transacted in the form of discounts, as at the banks in the United States, but when a note was presented, if the cashier

was satisfied with the names, the money was paid at once, always deducting the interest.* It was not always required that the subscribers to a note should at the time have a running account with the bank, but it was essential that one or more of the subscribers should be possessed of real property to the satisfaction of the bank. No person or club could draw any more money until the first note was paid, but in order to ensure a constant supply of money, the different clubs, by mixing and forming new combinations, found means to pay their respective notes, with the very money which they had drawn from the same bank on the same day. As improvements advanced, the demand for money became greater, and the number of banks increased, until one, two, or more banks, or branches of banks, were established in almost every town and village over the country, and a very great proportion of the business was ingrossed by farmers, manufacturers, and mechanics. This capital might be said to be fictitious and illusory, but the fruits produced by it were real and substantial. By this means three or four bushels of wheat were raised, where one had been raised before, and twenty or thirty fat cattle sold to the butcher, in one season, from a farm which formerly could hardly feed one beef for the farmer's own family. Every farmer could now afford to pay three times the rent

* It may be proper to observe, that notwithstanding the constant practice of discounting good paper on any day, and paying the money over the counter, the instant it is presented and approved; yet they have besides, their regular discount days, particularly the large banks in the cities; some of them three times a week.

which he was wont to pay, and at the same time live in as good a house, have as rich furniture, keep as good a table, and ride as fine a horse as the gentlemen formerly did. We have now abundance of banks, in the United States, with the names of Farmers' Banks, and Mechanics' Banks, but the farmers of this country will reap little benefit from them, until some such plan as the above is fallen upon, whereby they can have a constant supply of money, until they can bring their grain and cattle to a good market. The farmers of this country are generally proprietors of the land which they farm, whereas the others were only renters and very poor, yet by the assistance of the banks they were enabled to buy lime and other manures, cultivate sown grasses, turnips, &c.; buy in cattle for feeding, which produced abundance of dung, whereby the land was enriched from year to year, until the whole country at last became like a garden.

On the Haws, or Hooks, (so called) in Horses, by Richard Peters, Esquire.

Read June 8, 1813.

Belmont, June 2, 1813.

Dear Sir,

During the last winter, I had in my service, what is too common,—a conceited driver of my carriage, who believed himself exclusively acquainted with the management of the affairs of the stable. He wished me to *clothe* my horses, and had a foppery on this subject, whereof there are too frequent examples. I would not indulge this unnecessary and highly injurious propensity. Clothing horses subject to sudden and frequent exposure to cold and wet, I have known through my life (and I have owned horses almost half a century) to be dangerous to their health; and a preventive to, or destroyer, of the hardihood and strength, which that animal by nature possesses. On those its usefulness mainly depends. Were I compelled to the alternative, I would prefer an open shed, in which horses should be sheltered from bleak winds and rain, to a close stable. Much less would I choose, in any situation, to clothe them, when in health. But servants who wish to spare labour, will have horses wrapped in blankets, and kept in close stables. They add high feeding, (which is still more prejudicial,) to give them a sleek coat, and save themselves the trouble of rubbing and cleanliness. As my servant could not carry his point in one way; he determined on a course he considered equivalent.—He

stopped every crevice in the stable, through which air could be admitted; and fed unsparingly, contrary to my frequent injunctions. The consequences were, that several of my horses were seized with violent fevers. These appeared with the usual symptoms, and particularly in morbid affections of the eyes. The youngest horse was the most affected. On this account, horses of three to seven years old, are always in the most danger, as diseases of the eyes, in such horses, most frequently occur. It is not uncommon for young horses, especially if pampered, to be afflicted with early blindness. The loss of one eye is frequent; and in this case, that remaining is, generally, the stronger for the privation. Both eyes, however, often are lost. Pampering and *over-working* young horses should be carefully avoided. My servant knew, as he believed, *effectual remedies*. "My horses had the *hooks*," as the *haws* are vulgarly denominated.—"These must be *cut* out of the eyes." But, before I was acquainted with the subject, in my early life, I had a capital young horse, sacrificed to this mistaken and ruinous operation. Ignorant quacks do not know, that the horse has a membrane, peculiar to this animal; which is at pleasure, drawn over the eye, by means of a muscle with which he can draw the eye into the socket. The enlargement of this, by a fever, produces the appearance, which, in the jockey slang, is called the *Hooks*. Reduce the fever, by depleting remedies, such as bleeding plentifully, purging, &c. and the *hooks* disappear; —i. e. the membrane is restored to its natural size and office; which is, to clear the eye from insects, dust, and other pests inserting themselves, or accidentally

entering, this organ. I need not mention, that I would not permit the cutting out this useful membrane.

Two of my horses had swellings of the bars, or roof of the mouth, called *lampas*. Young horses are the most subject to it. It is occasioned by fever; and the horse should be treated accordingly. Sometimes a mess or two of hard corn (Indian) banishes this protuberance. *Burning* is usually practiced. It is not so ruinous as *cutting* for the *haws;* but I never suffer it to be done; having known horses irretrievably injured, by repetitions of this operation.

My horses were recovered from their fevers; but I believe two of them will never be totally relieved from the consequences. The complaints in the eyes frequently recur; and I fear will occasion blindness in one, or both of them. I blame myself, in some degree, for unusual remissness in frequent visits to my stables. Such negligence every owner of horses should cautiously avoid. True, we cannot controul or command servants in this country; in which the *Saturnalia* are celebrated every day in the year. Among the ancients, the servants were satisfied with one annual, but short, term of equality. The exemplary qualities of our ever lamented General WASHINGTON, shewed themselves in every department of his private as well as public, life. He was an early riser, and he commenced every day with a visit to his stables; in which he minutely examined and directed every necessary arrangement; and no person of his day knew better how to treat the horse; both in his support, and the various uses to which the services of this noble animal can be applied. It is to be earnestly desired, that

his example in this, as well as greater concerns, were more generally followed.

Proofs of the capacity of horses to bear the inclemencies of seasons; and their hardihood in a state of nature, are before us constantly. The danger of high feeding and pampering, we experience every day. Yet both are overlooked.

I have lately received an account of some wild horses, on an Island opposite Accomack in Virginia; which, though on a smaller scale than I had been informed it was, serves, among a thousand other proofs, to shew the inexpediency of *over care* in regard to this invaluable animal. I by no means wish to encourage inattention, or cruelty; not only because I abominate both; but because it would be a work of supererogation, as it respects too many proprietors of horses, or those they employ.—I send to you the letters containing the information I sought on this subject; with a wish to promulgate any important facts relating to it.

After the free use of the fleam, and the drugs of the shops, I began to despair of the recovery of my horses. But I put them on a diet, which most rapidly operated. I fed them, exclusively, on raw *potatoes*. The inflammation in the eyes subsided entirely; and the whole system recovered its usual functions, by this cooling, laxative, and detergent regimen. Precedent remedies, no doubt, were highly useful.

Yours very truly,

RICHARD PETERS.

DR. JAMES MEASE.
Secretary of the Philad. Agric. Soc.

On Breeding In and In, by Richard Peters, Esq.

Read July 14, 1813.

Belmont, June 29, 1813.

Dear Sir,

I perceive in Mr. *Ecroyd's* communication, page 52, "3rd. breeding in and in;" there is a striking coincidence of his experience with mine. You know that I very much despise accumulating facts, merely for the purpose of supporting an opinion. But truth requires individual facts, *pro and con*, to form just conclusions.

Mr. E. remarks "that (by breeding in and in) a "constant deterioration has taken place; the bone be- "comes smaller, and perhaps for the second and third "generation, the shape rather handsomer, but a conti- "nual diminution of size takes place; perhaps, how- "ever, the greatest defect is a want of increase, ari- "sing both from barrenness of the ewes, and the lambs "being so weak and sickly, as to die in great num- "bers." I can truly say that this, in most particulars, is exactly my experience. The last proofs I have had, were exhibited by my *Tunis sheep*. The original pair continued vigorous, and the ewe prolifick, to a late period of their lives. But their lineal descendants of the full blood, though handsome, were small; and mere runts in size, after four or five descents. They reminded me of a Polish dwarf I saw in London; who was a Lilliputian figure of a very handsome man. He said he was a nobleman of unmixed blood, through many descents. Whatever was the fact, he seemed to

be so; i. e. bred in and in.—I was compelled to sell off (last year) all the diminutives of my flock; at the price of small common sheep. In human subjects, such would be called manikins. Yet they preserved their figure; and superiority of mutton. The lambs were not apparently sickly; but they would die suddenly. Holders of Merino flocks can lamentably attest similar facts, in this respect. At least several flock-owners; of whose losses, in this way, I have been informed. The barrenness of the full blooded Tunis ewes, of the fifth or sixth descent, was also remarkable. But in the crosses, this was not perceived. The crosses, bred back, were always fine and superior sheep; and are yet so.

I know that intelligent breeders hold contrary opinions. Yet wishing, anxiously, for the prosperity of their flocks; I humbly think, that it would be best for them not to disregard *any* well attested warnings. Let them continue their in and in system, on their own judgment; which *may* be the best. But let them also cross; lest, per chance, they may, in the end, find themselves mistaken. It can do no harm, to multiply their chances; or,—in trite phraseology,—have two strings to their bow.—Many of them cross from necessity; or fortuitously. But let them do it systematically; i. e. cross, and breed back,—to $\frac{15}{16}$. They will find (as I presume, from some experience, to foretell) such to be the best sheep in their flocks.

Yours, very truly,

RICHARD PETERS.

DR. JAMES MEASE.

Secretary, Philad. Agric. Soc.

Observations on Guinea Grass, by S. Brown, M. D. of Natchez, Mississippi Territory.

Read, July 13, 1813.

Six years ago, I saw one or two plants of the Guinea grass, in the garden of M. Tremè, near the city of New-Orleans; but as I was, at that time, in no way concerned in agricultural pursuits, it attracted little of my attention. Last autumn, I again met with it, in great perfection, at Mr. Munson's, a few miles north of Fort Adams. Although Mr. Munson had not more than half a dozen of plants, he obligingly furnished me with a pint of seed, which I shared with my friends, in this territory, in Tennessee and Kentucky. Mr. Abner Green of Adams county had, for two or three years, cultivated this luxuriant grass, but I cannot learn that any person except Mr. Munson had followed his example. From two acres of this grass, Mr. Green fed from 30 to 40 or 50 animals every day during the summer season.

As neither Mr. Green nor Mr. Munson had any knowledge of the history of this grass, and as I had determined to cultivate it, I sought for further information in such books as were within my reach.

In Bryan Edwards's, history of Jamaica we have the following account of it.

"Guinea grass may be considered as next to the "sugar cane, in point of importance, as most of the gra-

"zing farms or pens * throughout the Island, were "originally created, and are still supported chiefly by "means of this invaluable herbage. Hence the plenty "of horned cattle both for the butcher and planter, "which is such, that few markets in Europe can fur- "nish beef at a cheaper rate or of better quality than "Jamaica. Perhaps the settlement of most of the "north side parishes is wholly owing to the introduc- "tion of this excellent grass, which happened about "50 years ago, the seeds having been brought from "the coast of Guinea, as food for some birds which "were presented to Mr. Ellis, chief justice of the Is- "land. Fortunately the birds did not live to consume "the whole stock, and the remainder being carelessly "thrown into a fence grew and flourished, and it was "not long before the eagerness displayed by the cat- "tle to reach the grass attracted Mr. Ellis's notice, "and induced him to collect and propagate the seeds; "which now thrive in some of the most rocky parts "of the Island, bestowing verdure and fertility on lands "which otherwise would not be worth cultivation." Vol. 1. page 186.

* Many of the pens of Guinea grass, in Jamaica, are of great extent; some contain 700 or 800 acres. I am informed by gentlemen who have lately observed it in that Island, that it is perennial, and that it forms a turf, which is divided and set out for the purpose of extending the pasture grounds. Some of it was brought from Jamaica to New-Orleans, in June last, by captain Califfe, who was highly gratified at finding it growing in such perfection in Natchez. He had been informed in Jamaica that it was difficult to procure seed that would vegetate. I gave him a quantity of it for his friends in N. Carolina.

From Willich's Domestic Encyclopedia, I make the following extract.

"Guinea grass* a valuable species of herbage thus "denominated as it was first discovered on the coast of "Guinea, whence it was brought to Jamaica and after- "wards imported into this country. (England.)

"In point of real utility, this plant ranks in Jamaica "next the sugar cane; for the breeding farms through- "out the Island were originally established and are still "supported chiefly by means of the Guinea grass "which bestows verdure and fertility on lands that "would otherwise not deserve to be cultivated. About "10 years since it was introduced into the East Indies, "where it is now successfully cultivated, and grows to "the height of seven feet; it admits of being frequent- "ly cut, and makes excellent hay: cattle eat it both in "a fresh and dry state with great avidity; hence the "culture of this valuable herbage has been strongly re- "commended to the farmers of Cornwall and Devon- "shire.—"

The subsequent remarks on the culture of this grass are by the late H. Laurens, of S. Carolina, and added to the foregoing by the American editor of that work.

* I could have wished that the author of the Domestic Encyclopedia, had given us the botanical name and characters of this plant. For want of books I am unable to supply this deficiency.† Bruce in his travels in Egypt and Abyssinia mentions Guinea grass, but gives no account of its character or properties. I have conversed with many natives of Africa, who recollect to have seen it in many parts of that continent.

† A botanical description is subjoined to this paper. J. M.

"In the last spring I procured from Jamaica three "half pints of Guinea grass seed, which I planted in "drills of one fourth of an acre of *very indifferent land.* "The seed sprung, and soon covered the ground with "grass, four feet high and upwards. Being desirous "of saving as much seed as possible, I cut one bun- "dle of grass for horses: they ate it all with great avi- "dity.* In August I took one of the grass roots and "divided it into 28 parts, which were immediately re- "planted; every part took root, and the whole are "now growing very finely, and seeding. I am of opi- "nion this grass will make the best pasture we can "wish for.—From former experience I have reason "to believe the Guinea grass is perennial. It is easi- "ly managed, requires but one good hoeing, after "which it will take care of itself. Domestic Encyclo- "pedia, article Guinea grass."

With this little stock of information I commenced my experiments. In the month of April, I prepared a piece of ground in the city of Natchez, and planted the seed I had reserved for my own use, in holes two feet distant from each other. The season proving unusually cold,† and torrents of rain falling almost eve-

* It is curious to calculate the quantity which an industrious, planter can obtain from one seed.—Suppose that each of the 28 divisions of the root produced less than one half of the number of stalks I obtained from one seed, for instance 50 stalks, this will give 1400 stalks in one season, from a single seed. On good soil, in a favourable year, these will all attain the height of at least seven feet.

† Persons who have resided in the vicinity of Natchez for 37 years, do not recollect to have seen frost in May before this year,

ry day, all our small seeded crops were either totally lost, or materially injured. The vegetation of the Guinea grass seed was so much retarded, that until some time in May, I could discover no young plants. They at length made their appearance, in some parts of the lot. But some seeds remained six weeks in the earth, before they vegetated: and most of those gentlemen, to whom I had given seed, supposing them to have been gathered too green, appropriated their grounds to other purposes, or suffered the weeds to smother the young grass.

As soon as I could designate the Guinea grass, I had the ground well hoed, and where two or more plants came up together, I had the supernumeraries transplanted to spots where the seed had failed. When the plants attained such a size as would admit of it, I took them up, and dividing the roots, set them out when the soil was wet, and in this way filled up the vacancy in the ground I had appropriated to my experiments.

At Percyfield, near Fort Adams, Mr. Oglesby, my manager, planted about the eighth of an acre of *very fertile land*, with plants obtained from Mr. Munson, in the first and second week of May. They grew without any trouble except that of cutting down the first growth of weeds. On the 20th of June, he began to cut it for the use of the plough horses and mules, and continued to supply them with as much as

(1812.) On the nights of the 3rd and 4th of May the hoar frost was so severe as to destroy almost all the tender plants in the territory.

they could eat of it, during the whole summer. On the 25th of September he wrote me, that he had cut it *four times*. From 20 roots he obtained at the *fourth cutting* 250 pounds of green grass, and in two weeks, he would cut it the *fifth time*. The weather being very unfavourable, he did not succeed in curing the hay, by weighing which, he intended to ascertain the loss in drying.*

I did not begin to cut that which I had planted in Natchez, until the 16th of July, I then weighed the produce of one seed, in the presence of a number of gentlemen, at Mr. Robinson's hotel. One hundred and sixty four stalks, from six to seven feet high, growing from one root weighed together 30 pounds. At Mr. Winn's tavern, on the 10th of September a *second cutting*, from one seed, weighed 35 pounds. The number of stalks was 184, some of which measured 10 feet 11 inches in length. Some parts of the lot in Natchez is very poor soil, and the grass on those places did not grow higher than six or seven feet. But on a good soil, in a favourable season, in this climate, I am persuaded it is a very moderate estimate to allow to every square yard 10 pounds at a cutting, when we cut only three times in the season. This would give 30 pounds to every square yard, or 147,000 pounds of green grass to the acre. But this production seems so enormous, that I should not have ventured on such a calculation had I not the respectable authority of Mr. Edwards to support me. He asserts

* (See certificate of Mr. Oglesby.)

that the Scots grass* which he seems to consider as far inferior to the Guinea grass, is so productive, that one acre of it will support five horses the whole year round, allowing each horse 56 pounds per day, which is 102,200 pounds per acre. vol. 1, p. 185.

It is not pretended that the Fiorin grass† which, of late, has excited so much attention in Europe, will produce more than nine tons of hay per acre, and Mr. Livingston bestows great encomiums on Lucerne, which requires much more cultivation than Guinea grass, and yields only 4500 pounds per acre, at three cuttings. I am informed that the best timothy meadows in Kentucky never produce more than six tons per acre, in the most favourable seasons. But I am sufficiently aware of the fallacy of such calculations as I have been making. An experiment on *a large scale* is absolutely necessary to the attainment of an accurate

* Panicum hirtellum Lin.

† For an account of this grass see "Dr. Mease's Archives of useful knowledge" Vol. II, No. III. The plate of it given in that work might be readily mistaken for the Bermuda grass in this Territory, which the late much lamented Mr. Dunbar, had so much merit in introducing, and which will be found so valuable when the planters begin to perceive the folly of encreasing the number of their slaves instead of breeding Merino sheep. Few men were more capable of forming a just estimate of the comparative value of the stock farm and the cotton plantation than Mr. Dunbar—The cultivation of cotton, he has often observed yielded a miserable return compared to the profits of a stock of Merinos. His solicitude to procure that precious breed of sheep, for some months before his death, ought to suggest to his survivors the true and perhaps the only means of restoring the country to its former flourishing condition.

result. This season has been very wet, and grasses of all kinds, in this territory, have grown to an unusual length. Planters have found it necessary to make the most vigorous exertions to save their crops of corn and cotton from being choaked with grass and weeds. But admitting that my calculations are extravagant, let us suppose that an acre will produce *only one third* of what I have stated, still we must consider Guinea grass as the most valuable of all the known grasses.

I regret very much that Mr. Laurens did not mention the grounds upon which he expresses an opinion that this grass is perennial. In Jamaica I have no doubt it is so, but in this climate, I am persuaded, it is annual, and that during the months of September and October, it drops as much seed as is requisite to produce the crop of the ensuing year.* Indeed it is necessary every spring to cut down the superfluous plants in order to leave room for the spreading of those which are suffered to come to maturity—I have tried Mr. Laurens's method of dividing the roots and transplanting them, and find it answers very well for filling up such vacancies as happen from the imperfection of the seed, or from other causes, and which would occasion a great waste of labour and of land. The sooner in the season this is done the better, for I did not find that those plants which were thus removed in August,

* Since writing the above, Mr. Munson informed me that Mr. Laurens was correct, and that the roots which he examined in the last spring were perfectly green and putting forth a great number of shoots.

attained the usual size. In June and July this plan will succeed perfectly well.

I find very little difficulty in collecting the seed,* I have already obtained a bushel in return for three or four spoonfuls which I sowed on my lot in town—I cut off about two feet of the top with the panicle, as soon as the seed begins to fall, and after it is dry comb out the seed with a coarse comb—I hope to collect at least two bushels of seed during the autumn.

As the seeds vegetate very slowly, and as many of them are imperfect, the most certain mode of obtaining the young plants, would be that practiced by the cultivators of tobacco, who, early in the season, prepare a small spot of ground by burning the surface. On this they sow the seed, and tread them down with their feet. They then cover the spot with brush wood, to protect it from the action of cold winds, and the seed from the depredations of birds. As soon as the plants have attained the height of two or three inches, and when the danger of frost is past; they should be removed to the ground where they are to stand, where

* After our early corn is bent down in this territory, we may plant Guinea grass between the rows, and when we take out the corn in October, the fields will afford abundance of food for fattening cattle. I made a small experiment in this way, and have no doubt it may prove useful to those who have not a sufficiency of cleared land. If corn is planted in the succeeding March, the grass will not do any injury, as it does not vegetate until about the beginning of May. I think the seed might be sowed on wheat, in February or March, and as we cut our wheat about the 10th of May, the young grass would grow up among the stubble.

they readily take root.* A rich black mould, and a soil somewhat moist, I think produces the most luxuriant grass, but I have had very little experience on this subject. I hope that before many years, it will be tried in every climate in the United States, and on every variety of soil.† No kind of grass with which I am acquainted, supports the heat of the sun so well, and this property, was it even less productive, would recommend it to the notice of the agriculturalist, for, from the first of July, until it is killed by the autumnal frosts, it will afford a constant, and an abundant supply of green food, and consequently enable the farmer,

* There is no more difficulty in transplanting it, than in planting tobacco or cabbage. A basket or two of the young plants will be sufficient for an acre. One hundred plants would enable a poor family to keep a cow in town, or to supply a dray horse with green food all summer. How much would the general cultivation of this grass add to the comfort of the poor and middling classes of society!

† The planters are beginning to be sensible of the importance of winter pasturage in this climate, where snows seldom remain 24 hours. Wheat fields, and the tall meadow oats, [avena elatior,] may be pastured from November until March, when the white clover begins to supply our animals with green food. This grows luxuriantly until the month of July. Then Guinea grass will furnish a still more grateful food, until our early wheat lots require to be eat down, in October or November. Wheat, tall meadow oats, clover, and Guinea grass, afford green food every day in the year, in the climate of the Mississippi Territory. In what part of the union can sheep be raised with so little expense? In most parts of Europe, and in the middle and northern States, the winter keeping constitutes a principal part of the expense, and the severe frosts and deep snows destroy multitudes of lambs.

whatever may happen to his other meadows, to lay up a plentiful stock of hay, for the winter. If the hay is cut before the grass has grown too tall, less than two days sunshine will dry it completely. It is uncommonly fragrant, and horses prefer it greatly to the best corn blades. This experiment was tried on the 28th of September, when I sent Mr. Winn, of Natchez, a small bundle of hay, which had been exposed to the sun, about a day and a half. Mr. Winn put it into the bottoms of his mangers, and covered it with the best corn blades he could procure. The horses threw aside the fodder, and ate the hay with eagerness.

An acre of corn will not yield more than from 500 to 1000 pounds of dry blades. Considerable labour is necessary in gathering them, they are preserved with difficulty, as we cannot choose a favourable season, and with us they are always to be carried to the stack on the backs of labourers. As the Guinea grass, on the contrary, retains its verdure for several months, we can always cut it when the weather is the most promising; we can cultivate it on most plantations, near the place where we wish to feed it, or it may be carted out of the enclosure where it grows. If subsequent experience should confirm the principal facts which I have stated with regard to this grass, the intelligent farmer will soon perceive the advantage of cultivating it, instead of trusting to the scanty supply of blades, which he obtains from his corn fields, with such a waste of time and human labour. A Pennsylvania farmer, who knows the advantage of a timothy or clover meadow, considers it a folly to spend time in collecting corn blades. If Guinea grass succeeds as well

with others, and in every season, as it has done this season, with me, and as it has done in the West Indies for more than half a century, the planters of the south will have no reason to envy their northern neighbours, their luxuriant clover pastures, or their numerous ricks of timothy hay. Meadows are generally the most fertile part of every farm where they exist, and their value is augmented by their contiguity to the farm houses. If Guinea grass is substituted for clover, timothy, and lucerne, at least seven eighths of all the grounds appropriated to those crops will be given to the cultivator for the purpose of raising sustenance for the human species. To what amount this change will increase the sum of national wealth, I leave to those to estimate, who are more conversant with such calculations.

Certificates respecting Guinea Grass.

February 23, 1812.

Dear Sir,

Your favour of the 15th instant reached me yesterday. In reply to your inquiries respecting the Guinea grass, I will with pleasure give you such information as I have been able to make, to fulfil your wishes.

The first winter after I sowed the seed was fortunately mild, as it did not go to seed, in the spring it put up from the old roots. The branches I transplanted, and they grew luxuriantly. It seeded late in October. The roots were killed by the frost, but in the spring following, the seed that fell came up abundant-

ly, these plants I divided, and transplanted about three acres of ground, but owing to the spring being very dry, this could not be effected until the month of June, wishing to have the ground well stocked with seed, I made but little use of it. It seeded much earlier this year, and much more abundantly. In the spring following, (that is last spring) it came up in great abundance; when it got about two feet high, I began to use it for my riding horses and work creatures, in all not less than thirty head, and the growth was so rapid, that not more than half the ground was cut over, and some of this not more than once: my son, who was more particular than myself, informed me it grew six inches in twenty four hours. The seed sprouts about the time of the common grasses, coming up with a single spire and putting out a vast number of branches, something like wheat, each of which may be transplanted. This winter I have reason to believe the roots are also killed. It seeded in great abundance last fall, and much earlier than the two previous years. It continues green until it is killed by the frost. On the river I am persuaded it would seldom if ever be destroyed in the winter.

I am, respectfully,
Your obedient servant,
ABNER GREEN.

HENRY TURNER, ESQ.

On the 16th of July, 1812, I weighed the first cutting of one plant of Guinea grass, which grew in Dr. Brown's lot. Its weight was thirty pounds of green grass.

THOMAS ROBINSON.

Wilkinson County, M. T. Oct. 10, 1812.

I have frequently examined your lot of Guinea grass at Percyfield, and having for many years been in the habit of viewing both timothy and clover meadows, in the state of Virginia, where plaster of Paris has been used, I have no hesitation in saying, that one acre of Guinea grass will produce more than six times the quantity I have ever known produced by an acre of any other kind of grass.

M. Bronaugh.

Dr. Brown.

Percyfield, Wilkinson Co. M. T. October 15, 1812.

I have for many years been accustomed to both timothy and clover meadows, and have frequently assisted in cutting some of the best in the state of Kentucky. At Percyfield, near Fort Adams, I cultivated a lot of Guinea grass, somewhat less than a quarter of an acre, from which I fed six or eight horses, during the summer of 1812. I planted it the second week in May, and began to cut it the 20th of June, and cut it five times before the 15th of October, and obtained from each plant (which occupied a square yard) about sixty pounds of green grass. I have frequently observed it to grow four inches in twenty four hours. From the astonishing growth, and from the result of all my experiments, I have no hesitation in saying, that it will yield ten times as much grass as any timothy or clover meadow I have ever seen. It is now (15th October) as green as it was in June, and animals are remarkably fond of it, both green and dry. The hay is excellent, and cures without difficulty.

Joseph B. Oglesby.

Of Jefferson Co. Kentucky.

Guinea grass, according to Browne, is a species of Holcus, the characters of which, he says, agree pretty well with those of *Panicum* in general, but the flowers commonly grow very luxuriant, and though often hermaphrodite, are generally observed to be male and female, distinct, surrounded by separate involucres, and standing on distinct pedicels, within the same calyx. —See Browne's Civil and Natural History of Jamaica. Folio, page 366. London, 1756.

Dr. Martyn treats of it under the genera *Holcus* and *Panicum*.

Mr. Correa de Serra informs me, that in "the botanic garden at Paris, where Guinea grass has been with great care cultivated by Mr. Thouin, it is known by the name of *Panicum altissimum*, and it is very probable, that the frequent abortion of either of the sexes, in a great number of flowers, was the reason why Browne, and other scrupulous and literal Linnean botanists, put it in the genus *Holcus*, notwithstanding all its characters were of *Panicum*." Dr. Martyn describes it among the panicums, under the name of *Panicum maximum*, in the following words:

Panicum maximum. Culms from five to ten feet high; upright, simple, even. Leaves lanceolate, towards the top convolute and sharp, smooth, except at the

edge, which is rugged, and at the base, which is rough haired. Panicle erect, a foot long and more; the lower branches in whorls, the upper in pairs. Florets numerous, alternate, ovate, sharpish, pressed to the raceme, on short, subflexuose pedicels. Spikelets polygamous. Outer valve of the calyx very small, inner oblong, sharpish, pale. Instead of the hermaphrodite, there is often a female floret, with a male at the side of it, or a female alone, without the hermaphrodite and male. Seed oblong, shining. In Jamaica it flowers in October.

Directions for the culture of Guinea grass will be found in Dr. Martyn's edition of Miller's Gardener's Dictionary, under the article *Holcus pertusus*.

Besides the account of Guinea grass in Edwards, and the Domestic Encyclopedia, additional information may be obtained by referring to the Letters and Papers of the Bath and West of England Society, vol. 5, and Young's Annals of Agriculture, vols. 9 and 13. All agree in the extraordinary fattening properties of this plant, and to our southern States it cannot fail of being of incalculable benefit. J. M.

Account of a Crab Apple Orchard, by Henry Wynkoop, Esquire, of Bucks County.

Read August 10, 1813.

Belmont, July 24, 1813.

Sir,

I send, for the Society, a letter from my old and much esteemed friend, HENRY WYNKOOP, Esquire, in answer to some questions I troubled him with, relative to his orchard. He gives a highly encouraging account of the profitable produce of two hundred trees, on five acres of ground. I will endeavour to obtain the history of the Virginia Crab. Most of the orchards in my neighbourhood, as well as my own, have long been declining. I have spared no pains in endeavours to render them flourishing: but have not succeeded to my wishes. They are planted in every soil and situation. Some are cultivated, i. e. sown with grasses and grain. All well manured, save one, which is in a soil by no means poor, but it has not been disturbed by the plough, for many years. The trees are of all ages, from seventy or eighty years, to twelve and fifteen. In the grounds kept loose and rich, they bear abundantly; but ripen and fall too early for winter use as fruit, or for cider. I have no *Crabs;* but have every variety of other sorts. The oldest kinds, such as *Pippins*, *Vandevers*, *Spitsenbergs*, &c. which, in my youth, were fair, inviting, and plentiful, are now forbidding, knotty, and scarce. Such is the case in *Europe*, with their old fruit trees; as may be seen in *Marshal's* account

of the most famed apples of *Herefordshire*, in *England*. I recur to my old doctrine, that the earth delights in changes of products. The *old* trees give evident proofs of this position. Natural trees endure longer than those engrafted.

I think Mr. Wynkoop's trees are all too near each other. Mine stand in squares of forty feet. I have heretofore, Vol. I. pages 211, and seq. given an account of my orchards. It will be seen, page 217 of that volume, that I had suggested to Mr. *Coxe*, the belief of many orchardists, that clover was in itself injurious. He thought otherwise; but in Mr. Wynkoop's answer to query 2d, he mentions a fact relative to the bad effects resulting from clover; which may, indeed, apply to any other plant, likely to invite vermin. I know several crab orchards; some whereof are ploughed round the trees, some not stirred; and yet they are generally more productive, than those of the kinds commonly planted. I think Mr. Wynkoop's success, is a conclusive argument that *his* practice is the most favourable, on every account; at least so far as respects this species of tree; than which no fruit-tree can pay better for the pains bestowed on it.

Your obedient servant,

RICHARD PETERS.

DR. JAMES MEASE.
Secretary, Philad. Agric. Soc.

Vredensburg, July 18, 1813.

Dear Sir,

Having had the pleasure to receive your letter of the 28th ult. I proceed to answer your enquiries relative to the kind of fruit, of which the cider you allude to is made by me; some of those questions would have required dates, which I do not possess, to render the answers perfectly correct; I shall, therefore, with the assistance of my son, who now has the entire management of my farm, endeavour to give you such information, as our joint recollections afford.

Query 1. As to the species of apple?

Answer. That is entirely of the Virginia crab.

Query 2. The number of trees?

Answer. The whole number of trees is two hundred and forty, but the actual bearing trees do not exceed two hundred, for having some years ago, for the purpose of preserving the ground in a loose state, and also to procure some produce from the soil, sowed it with red clover, such numbers of ground mice were harboured therein, as effectually to destroy not less than forty trees: those have been replaced, but the young ones are not yet in a perfect bearing state.

Query 3. The extent of ground?

Answer. That we suppose to be about five acres.

Query 4. How long planted?

Answer. We suppose about twenty two years.

Query 5. The distance the trees are from each other?

Answer. That is twenty feet, but is much too close; all the orchard in which we have since planted, the trees are thirty three feet apart, which I consider as the shortest distance that ought to be between them.

Query 6. The nature of the trees as to hardihood?

Answer. We have reason to believe it may be ranked among the most hardy of apple trees, it also possesseth a greater degree of toughness and elasticity, than what commonly exists in the wood of any other species of that fruit, that I know of, for the branches will bend, loaded with fruit, until they hang almost perpendicular, and yet rarely break.

Query 7. What soil they most delight in?

Answer. This I do not know, for they appear to thrive equally well, wherever planted, and well attended to.

Query 8. How long are they coming to maturity?

Answer. This depends so much on the care and culture of the ground, as to render the time of coming to maturity very uncertain, but I believe that of the crab to be as early as that of any other apple trees, under like culture.

Query 9. Whether or not they are long lived?

Answer. The length of time, during which we have cultivated this species of fruit, is insufficient to enable me to answer this question correctly.

Query 10. The general annual value of the crop?

Answer. The crab is a biennial bearer, so that for some time past, every other year has yielded us about forty iron bound hogsheads, averaging 112 gallons each, of the crab cider, which has been hitherto sold from the press, and delivered in Philadelphia, at two shillings and six pence per gallon: when fermented, fined, and fully prepared for bottling, we have sold it for the use of private families, at thirteen dollars per barrel, exclusive of the cask.

Query 11. Are they more or less productive, or more or less liable to failure of crops?

Answer. As they only bear every other year, I have hitherto discovered no failure of crop, in the bearing year, but a uniform profusion of fruit.

Query 12. As to the mode of pruning?

Answer. My method of pruning has been, as early as the young growth of the tree would permit, to form or shape it so as to render the top spreading, and to remove all superfluous branches: and afterwards, once a year, in the months of February or March, to repeat this process, and remove all sprouts from about the roots, and particularly from the branches, so as to leave them unincumbered with unnecessary growths, and afford a free admission of the sun and air to the fruit.

There exists, as you observe respecting your own orchards, an undoubted failure in the apples generally, which probably may arise from causes over which we have no controul, such as easterly winds and storms: and also insects which injure the fruit during the time of blossoming. Two species of apples appear as yet to have escaped this general decay, viz. the crab and the pearmain; they continue smooth and fair, while most other kinds are small, knotty, and absolutely unfit for any use but the distillery. What I have found most beneficial, to preserve the trees and improve the fruit, is manuring and cultivating the ground without cropping, solely for the purpose of preserving the soil in a loose and pulverised state, and to prevent the growth of grass. The alternate bearing of the crab, I consider as advantageous, because thereby, in every other year,

an opportunity is afforded, for the free use of the plough and harrow, and also for fertilizing the soil, which cannot be done in the bearing year, because of the bending down of the branches, by the weight of the fruit. The last manure, put on my crab orchard, was entirely of leaves and virgin earth from an adjoining wood, which has produced a powerful effect on the growth and verdure of the trees.

I remain, yours, &c.

HENRY WYNKOOP.

HON. RICHARD PETERS.

Account of the progress of Col. Taylor's Hedge, and on cultivating Indian Corn, agreeably to a plan formerly suggested, being an Extract of a Letter to the Secretary, dated Port Royal, Virginia, July 24, 1813.*

Read, August 10, 1813.

My hedging experiment proceeds, not with the spirit merited by its importance, but in a degree to ascertain its practicableness. I have used no manure, some culture, and only an annual clipping; and yet the oldest hedge is at this time handsome. It is however only half the hedge; the idea of planting cedars on the outside of the dead fence not having presented itself for several years after they were planted within, so that the latter have gotten greatly the start. Upon a view of it, I believe the most incredulous would agree, that when the younger half of the hedge attains to the same state, a more perfect live fence will hardly be expected.

The cedar hedge around my stable yard, being suffered to grow too high before it was cut, it became necessary to lop boughs, extending to two inches in diameter. The operation was nearly destructive to the hedge, and it has not yet recovered the blow. At the same time I clipt, with garden shears, the young hedges, without injuring them. From these facts it is probable, that the training of the hedge by clipping, ought

* See Agricultural Memoirs, Vol. II. pages 57, 75.

to commence the second year, and that its form ought to be regulated with a view to limit all its wounds to small boughs.

Apertures are certainly closed by bending boughs into them, to be covered with earth about the middle, where they will take root, and their extremities will of course grow and spread. By raising the bank of the ditch about six inches, after the hedge is nearly grown, the earth and the bottom boughs (if the latter have been properly managed) are brought into close contact; and the hillocks made in planting boughs, are brought to a level, by filling up the interstices.

The culture of a cedar hedge on a ditch is extremely easy, and the expense of manuring it trifling. The surface of the bank of the ditch is drawn with a hand hoe, from the top to the bottom, together with the weeds and grass on it; ground so covered with the boughs, as not to admit of the hoe, is weeded with a spade; and shrubs not otherwise to be removed, are cut up with a mallet and a wide chissel, fixed to a handle three feet long. The collection of earth, grass, and weeds, lies a few days in the ditch, on one side, and at the bottom of its bank on the other, with the clippings of the hedge, and constitute a compost, the whole of which is returned as a dressing for the hedge, which, though poor, is beneficial. Without culture, a hedge is not to be expected.

The experiment of cultivating annually and alternately, a moiety of the same field in Indian corn, keeping the other moiety ungrazed, and using gypsum, is

still proceeding. The difficulty of getting gypsum, has however, compelled me to bestow only three pecks to the acre, on the moiety cultivated, and none on that at rest. Though the project is thus crippled, the crops annually increase. I am uncertain, however, as to the causes of this, because an improvement of crop is regular in those parts of the farm, in which Indian corn, every fourth year followed by wheat, is the course. Hence I refer it, in some degree, to a practice common to all. It is this—For a few years past, I have raised corn, and most other crops, on ridges, five and an half feet wide, divided by very deep and wide furrows, and both the land and crops have improved faster, since this practice commenced, than before. When the field comes into culture after rest, these ridges are reversed by deep ploughing, with four horses. The alternation deepens the soil. The chief part of the rubbish of dead grass or weeds, falls of itself, or is thrown by the plough into these deep, wide furrows. There it is buried so deep, as not to produce the common injury to the crop from breeding insects, or rendering the earth too loose, frequently caused even by clover lays. The air, generated by its gradual putrefaction, keeps the ridge mellow and warm, and the roots of the crop, whatever it is, find their way to this stratum of manure, which, during its slow decomposition, preserves a moisture, constituting a considerable resource against drought. Much labour is saved in fallowing, because the deep furrow enables the plough to cut off a wide land on each side of it, by which it is filled, without needing itself a touch of the ploughshare, leaving a string of the old ridge, so narrow, that a large plough, with two

mould boards, splits it. And thus three furrows reverse ridges of five and an half feet wide. The old furrow enables the ploughing to be done deeper, than could otherwise be effected, as it is a receptacle for the two lands by which it is filled, and these leave wide and deep furrows, to receive each a moiety of the residue of the old ridge. The deep ploughing, and complete subversion of the sod, produced by the strength of four horses, with the advantage of the furrow to receive the lands, buries seeds so deep, that few can pierce the tegument, and greatly facilitates the culture of the crop; or if it be of the culmiferous family, sown broad cast, obstructs the vegetation of weeds among it. The ridges are made east and west, to equalize the influence of the sun. If the theory "that the atmosphere is the source of manure, into whatever form it may be elaborated by an animal or vegetable process" is true, it is probable that the bringing a greater portion of the surface of the earth in contact with it, by high and frequent ridges, may increase the inhalation of this its food; and that the direction of these ridges may diminish exhalation. How far these or other circumstances, may have co-operated with the gypsum, in the second experiment, or in the general improvement of the farm, I have not attempted to discover, but my impression is, that the detailed practice, constitutes no mean auxiliary to the other fertilizing expedients.

Remarks on the great damage done to Apple Trees by erroneous Pruning, by the Rev. Dr. Nicholas Collin.

Read October 13, 1812.*

Philadelphia, September 25, 1812.

Dear Sir,

Desirous of contributing my small aid to the pursuits of the Agricultural Society, I present some remarks on the pruning of apple trees, the communication of which may be useful to the public, though not to persons well skilled in horticulture.

I have the honour to be, with great esteem,

Dear Sir, your most obedient servant,

NICHOLAS COLLIN.

DR. JAMES MEASE.

Secretary of the Philad. Agric. Soc.

Apples being the principal fruits in the greater portion of the United States, merit particular care. I shall confine my observations to them for the present, though in part also applicable to other kinds.

Mismanagement often begins in the nursery, by leaving suckers from the roots, by letting the trees grow so crooked as to become incapable of a good shape, and, especially, by leaving branches for two or three years, which must be cut away when the tree is planted, because they are too low, or crowd the head.

* This, and the two following papers were accidentally misplaced.

This incumbrance has wasted a great part of the sap, which would otherwise have increased the regular growth. The wounds occasioned by this lopping cannot soon be covered with new bark, and in the mean time often produce a decay. Sometimes this neglect is continued in part, when the trees are removed from the nursery, because some persons regret the loss of branches which would bear the same or the next year, and others cannot foresee the bad consequences of keeping them, which will increase with their growth, and force a much worse amputation. The head of every tree should begin at least six feet from the ground; and of those whose branches are sloping, eight. When the head has been formed so low as five feet, but is well grown, it may be continued, but then its branches ought to be trimmed near the stem, and by some contrivance be enabled to rise. The head ought to have but one leader, because two seldom succeed, as the inward lateral boughs will cross each other. Its branches should be equidistant, and not more than six, nor less than four. If the tree has ample root, and a strong body, the head may retain an upper tier, provided it is two feet above the first; but if not, it is best to leave only such upper branches, that have this height, and form the others from good buds. It is a bad practice to shorten the top or the branches, except a little when they are too slender for their length; by excess, it may be very difficult to procure a good leader; the branches will grow bushy, and be later in bearing, because the first fruit comes towards their ends.

Trees are not to be kept too long in the nursery, because the small space allotted for them will not per-

mit a regular expansion either of the root or the branches; besides, the removal, however careful, often kills them, or causes a lingering decay. An accurate inspection of the roots is necessary, for taking away any carious parts, and worms, and also for cutting off those that cross each other, or are too close. None but long ramblers ought to be shortened; and they should be spread equidistant, so far as is practicable, which may be facilitated by wooden pegs. The too common fault of squeezing them into small holes, has ruined many trees; they must be wide enough to extend at least one foot beyond the limits of the longest roots, and the mould be made quite mellow.

A tree well pruned, planted, and secured by stakes against violent winds, requires frequent attention for some years:—the sprouts that come from the places of the removed branches, must be rubbed off at their first appearance; so likewise all that would produce irregular boughs, whether crowding, crossing, or shooting too upright from the regular branches: new tiers are to be formed at proper distances, as the trees advance: moss, insects, and any filth must be scraped off without damaging the bark: the roots must also be examined near the surface of the earth, as worms have lately been observed to corrode the bark.

When a tree has by this management acquired an habit of regular growth, it will be easy to keep it in good order.

When, by neglect, irregular branches have become large, as beyond a diameter of two and an half inches, it is unsafe to cut them off, but some of their smaller

boughs may be removed. If they gall others, the amputation cannot be avoided, but healing plaster, and good covering should be applied to the wounds.

Many persons are so stupid as to mangle regular and healthy trees, on the pretence of making them better by thinning; lopping off branches thicker than their own arms and legs, moreover, lacerating the parts; and leaving them exposed to all the injuries from heat, cold, wet, and insects, and thus a certain prey to gangrene. Saving the stumps will not avail, because they convey moisture and frost to the stem, even before they rot. In a few years, large holes appear in the body of the tree, the remaining branches become sickly, and produce bad fruit, and a premature death is generally certain. Often have I, with indignation, seen waggon loads of the finest branches, full of bloom-buds, in the spring, brought from the orchards by such senseless wood-choppers!

A regular position of the branches round the stem, will give to the inner parts ventilation, and admit sunshine, without much thinning. It will also by a balance of weight, keep the tree upright, and enable the several parts to resist violent winds, and to support loads of fruit. Clusters of limbs on one side must incline the tree more and more, so as to be easily torn up by the root, and also weaken the hold of these branches to the stem. Indiscreet pruning of the inner parts will accumulate the fruit on the outward, and thus make the weight more powerful, as on a lever.

The importance of good pruning is additional in this country, from the frequency of westerly winds, which

give a contrary bias, and from the irregularity of the seasons, which in some years causes a great defect, and in others an excess of apples. A striking example of this happened in the autumn of 1810, when a vast number of trees lost many of their branches, and many in a leaning posture were torn up, owing to the admirable quantity of fruit, without any uncommon gales.

On Lime and Marls, by Mr. John Lang.

Read April 14, 1812.

Sir,

The inquiries which have lately been set on foot in our society, concerning the different varieties of lime, have created a considerable degree of interest, but perhaps not more than the subject deserves. Were the question clearly decided, whether lime is possessed of any nutritious quality, or if it only acts as a stimulant, by dissolving such animal and vegetable substances as lie inert in the soil, and thereby preparing them for the food of plants, it would go a great way towards removing any difficulties which may stand in the way of such conclusions as we may find it necessary to draw from our farther investigations upon lime, or other calcareous substances. Besides, we might be thereby enabled to account for the various theories which have been adopted, by practical and scientific enquirers, upon these subjects. You have declared yourself freely in favour of the last position, and have done me the honour to take me into the list with yourself.

Dr. Tennent, in his remarks upon the recent improvements in Scots husbandry, thus observes, "It is "the property of calcareous substances to act very "powerfully in dissolving such vegetable and animal "substances as are deprived of life. Under the action "of lime, vegetable matter in particular is speedily "dissolved; but, if it be either used in excess, or if "the land be too severely cropped, without allowing a "necessary restorative of putrescent manure, every one

"knows that the soil is soon exhausted, and rendered "incapable of supporting any kind of vegetation." Here, in my opinion, the terms *calcareous substances* are too general and vague; for, though some calcareous substances are known to be powerful solvents, others perhaps possess nothing of that quality at all, or at least in a very inferior degree. We know that from 25 to 50 or 60 bushels of our best lime is a sufficient dressing for an acre of land; according to the poverty or richness of the soil, at the time it is applied; whereas Dr. Anderson says he has had experience of lime in all proportions; from one hundred, to seven hundred bushels to the acre, upon a great variety of soils; and has always found that its effects in promoting the fertility of the soil, have been in proportion to the quantity employed, other circumstances being alike.

From these, and other cases which might be enumerated, would it not be a natural conclusion to suppose that our strong lime acts by its solvent quality, in dissolving or decomposing such soluble substances as they meet with in the soil? We find, when too great a quantity is applied, especially if the land is poor, instead of benefiting, it is often hurtful to the crop; but when applied in proper proportions, and with a judicious rotation of crops, it is a most valuable manure; whereas Dr. Anderson's lime, of which too great a quantity could not be employed, must have possessed very little, if any, solvent quality, and its fertilizing powers must arise from a nutritious principle. And this agrees with the account of the mild lime, which my friend, John Mills, of Chester county, put upon

part of a field which I saw. He said its effects were similar to dung, giving out its strength to the first crop, but that they were soon exhausted. Perhaps if he had put on two or three hundred bushels to the acre, instead of sixty, they might have lasted longer, for though the lime he used is considered of very little value, it may possibly be considerably stronger than that of which Dr. Anderson put seven hundred bushels. But if our farmers in Pennsylvania, had no other lime except such as would require three hundred bushels per acre, I presume very little would be used for manure, for this plain reason, that they could buy as much land for the money, as the lime would cost.

Dr. Anderson sets it down as a fixed principle, "that there is only one kind of calcareous matter; and "that all the varieties of calcareous substances we "meet with, are entirely occasioned by a diversity in "the nature of the extraneous bodies with which the "calcareous matters are united, or a difference in the "form it may appear in at the time." If this is the case, the enquiry should be, whether the most pure and unmixed calcareous substances, or those which we find in combination with other matters, are the most valuable, either as a cement or for manure. The most pure calcareous substances which we know, are chalk, pulverized shell, and the most pure shell marl. For a cement it is well known, that these three varieties are of little or no value; and as a manure they require a great quantity to produce any effect. The most pure shell marl, which will be found to contain less extraneous matter than any stone lime, requires at least forty loads to an acre, and, sometimes, from one hundred to three hundred loads are put on. But if the most pure calcareous substances are the most valuable manures, how much more pure must gypsum be, of which one or two bushels to an acre produces such an effect? And how much purer must we suppose the limes, which require no more than from twenty five to fifty or sixty bushels to an acre? But the contrary has been shown to be the fact. It is also a fact, that those limes, of which a great quantity is required for manure, when used in building admit of a very small proportion of sand; and that of a fine soft grit. Of this class is the lime made from chalk, and all the limestone of the Bahamas, the West India islands, and the south west coast of this continent, which I am told consists of immense rocks formed of shells, in some instances very little changed from their original state; whereas our strong lime in Pennsylvania requires a great proportion of sand, of a sharp grit, and makes a very strong cement.

I am inclined to think, with Dr. Anderson, that there is only one kind of calcareous matter; and with Dr. Darwin, that it has all originally been an animal production; that though the putrescent particles with which it had been formerly combined, have long been dissipated, it may still retain gases, which, when disengaged, are nutritive to plants; that pure calcareous matters have little or nothing of a solvent quality; and that gypsum and lime derive their respective properties and additional value from the combination of calcareous matter with mineral acids, and other extraneous substances. Hence I conceive, that if the pure cal-

careous matter contained in gypsum (which is said to be 33 per cent) were separated, it might make a very good manure, at the rate of three hundred bushels, more or less, to an acre. All the English writers on this subject consider the different varieties of lime and gypsum valuable in proportion to the quantity of calcareous matter which they respectively contain; and that this class of manures has most effect upon soils which contain the least calcareous matter, previous to their application; upon this principle, how will they account for the effects produced by one or two bushels of gypsum to an acre, not only upon lands which never have been limed, but also upon limed land, a fact confirmed beyond a doubt, by the universal experience of our farmers? It is true, indeed, that marl is less valuable, in proportion to the quantity of extraneous substances which is mixed with it; but in this case, the calcareous matter has not entered into a chemical combination with the extraneous particles; but, though mixed, are still distinct; and these generally consist of clay, sand, or peat-moss, which are in their nature more inert than the calcareous matter.

Dr. Anderson gives the best account of the natural history of shell marl, that I have any where met with; but it appears to me, that he has never had the opportunity of using it; because his account of its effects upon the soil will only apply to what he calls clay marl; which is nothing more nor less than mixing different soils. But the use of what is called clay marls and stone marls, are now almost universally laid aside; the expense of hauling being found, in most cases, to exceed

the profit derived from them. It would seem that the circumstance of the dressing Du Hamel's marble chimney-piece, has become the ground work of Dr. Anderson's, or more properly the English, theory, concerning calcareous substances, which has been carried to such a length as to lose sight of the practical experience of farmers. But had Du Hamel been along with me, I could have shown him many instances of a remarkable effect produced upon natural as well as sown grasses, by the small dust, from the dressing with the hammer of the hard whyn-stone, of which many stone dykes, or fences, are built in Scotland. This has been often observed by many besides myself, and could not be attributed to calcareous matter. Whether sulphuric acid was the active principle I shall not pretend to say; but the whyn-stones, when broken, emit a strong sulphuric smell. For my own part, I pronounce nothing positive, my motive is to bring every theory to the test of experiment. If these hints have any effect in calling forth further investigation, my object is obtained.

If you think this worth presenting to the society, you may, if you please, accompany it with your free remarks.

I am, sir,

with great respect,

yours, &c.

JOHN LANG.

RICHARD PETERS, ESQ.

In presenting to the society this legacy of our late worthy member, Mr. LANG, I cannot repress my sincere regret for his loss. His constant desire to be useful, was always evident; and the efforts of a strong natural understanding overcame the privation of literary acquirements. Such men are more valuable in society, than are those who hide their talent under a bushel; or turn their faculties, however improved by education, to subjects subservient to ambition, or selfish pursuits.

I shall leave the subjects of his letter on their own merits. I have always been of opinion, that English writers knew little of the *modus operandi* of the *gypsum;* and I have great reason to believe, that their acquaintance with *lime*, is not correct, or sufficiently extensive. Mr. *Lang* and myself have taken much pains to procure, from our chemists, analises of our limestones; in hopes of confuting opinions, considered erroneous, by facts. But we have heretofore been unsuccessful in our endeavours. Until facts are settled, opinions must remain as they are. Meantime, what Mr. *Lang* has suggested will be a ground of inquiry; and stimulate some public spirited chemists to make investigations. we know results; and causes must continue problematical.

What he says of the effects of the offals of the *whynstone*, or *basalt*, I have perceived in the application of every kind of matter having *sulphur* in its composition. There is a sharp dispute among the learned, concerning the composition of *basalt*. Some affirm it to be a volcanic production. Others that it consists of *ochres*,

zeolite, marine *shells*, and calcareous matter. Great bodies of *limestone*, are often found in contiguity, or in its vicinity. I am not competent to say whether the *whyn-stone*, does or does not contain sulphuric acid. A species of the *basalt*, in *Ireland*, is used in cement; instead of *puzzolan*, with equal effect.

RICHARD PETERS.

August, 1813.

On the Long Island Hay Horse-Rake, by Mr. Reuben Haines.

Read July 14, 1812.

Philadelphia 6 *mo.* 8*th*, 1812.

Esteemed Friend,

During my visit last summer, on Long Island, I met with a horse-rake of a very simple construction, with which I was so well pleased that I requested a friend to get one made, that I might present it to the Philadelphia Agricultural Society, and have this day received from him, Captain De Groot's receipt for the same, having been put on board the schooner Express, at New York, and now inclose it.

The account given by the inventor is as follows:

"*Description of a horse-rake used in the southern* "*parts of the state of New York, which in raking hay,* "*on level ground, is believed to save the labour of six* "*men.*

"The rake is generally made of white oak; the "head frame is nine to ten feet in length, and three "and an half inches by two and an half in diameter; "the teeth are about two and an half inches apart, "twenty two inches long, and one inch by one and an "half in diameter:—the one sent has thirty teeth, "there are seven small standards on the head, design- "ed to collect the hay, and are about eighteen inches "high:—there are two curved handles, about three "and an half feet long."

The great advantage that this rake appears to me to possess over all others that I have seen, is, its extreme-

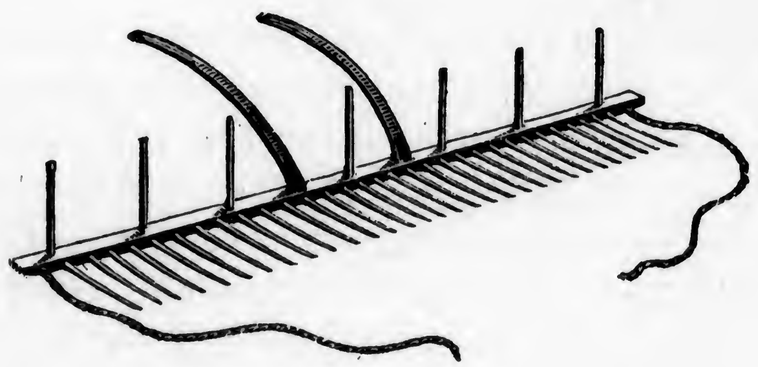
ly simple construction; and less liability to get out of order, owing to the teeth lying flat, instead of standing perpendicularly to the ground, as is usually the case; and in case of striking a stone or other obstacle, instead of being broken off by it, are merely driven more firmly into the frame.

Should this instrument not prove well adapted to our Pennsylvania farming, I hope its presentation will be considered by the society as evincive of a wish to promote their laudable designs, on the part of a sincere well wisher to the true interests of agriculture:—their fellow member.

REUBEN HAINES.

DR. JAMES MEASE.
Secretary, Philad. Agric. Soc.

One of the hay rakes was presented by Mr. Haines, and is preserved in the apartments of the Agricultural Society.



Salutary Effects of FIRE, *on Soils, by R. Peters, Esq.*

Read September 14, 1813.

Belmont, July 20, 1813.

Dear Sir,

I frequently introduce points worthy of consideration, that they may be more ably treated, by those whose science and practice are superior to mine.

I have often experienced the great utility of FIRE, in fertilizing land. I could give many instances which have passed under my own observation; both recent, and of very old date. I can shew numerous spots in fields, on which large collections of weeds were burnt, twenty years ago; which now exhibit, and have so done ever since the operation, a most extraordinary comparative fertility, in ground, the whole whereof has been well limed, and otherwise manured. Burning heaps of straw, I have found efficient. Leaves, and other trash, from hedge rows, chips and brush, have given fertility to barren spots; most evidently and durably. Although I have been long in the practice of devoting some of such materials to the compost heap; yet I am convinced that burning most of them on the ground, would produce equally good effects; and most probably, extend their influence longer and farther, than if rotted down. If this idea should even be thought whimsical; it is, at least, worthy of consideration and experiment. Having frequently turned the subject in my mind, I have not been able to account for it, in a manner satisfactory to myself. The ashes of such light

substances, soon spend their force. No ashes will so durably evidence fertilizing effects; be they even of wood, coal, or other solid material. It must, therefore, be some unaccountable result; produced on the soil, by the agency of FIRE. And of this opinion, I have long been.

That I may not be deemed singular, in an opinion not generally attended to, yet, no doubt, transiently perceived, without endeavours either to account for it, or to extend its advantages; I will copy some passages from the Rev. Mr. *Dubordieu's* "*Statistical Account and Survey of the County of Antrim,*" before cited, on another occasion. The facts relative to this subject are drawn into a compass, which will not fatigue those who read little, and believe less, of what they call "book-farming." Other authorities might be cited.

"*Of the Effects of Fire upon Land.* Vol. I, pag. 231.

"The effects of FIRE upon land, as a manure, do "not seem to have been understood till of late years. "That sod-burning, burning clay, or peat or turf bog, "have long been practiced with success, is well known "to every person acquainted with the practices of hus- "bandry in different countries; but the good derived "has always been attributed to the quantity of *ashes* "that have been obtained; and not the mechanical or "chymical operation of the *fire* upon the soil. But to "prove *that it is that operation which does produce the* "*benefit*, nothing more is necessary, than to mention "the substances used for this purpose, and the small

"quantity of them. Mr. *Young*, in that excellent book "the FARMER'S CALENDAR, mentions numerous in- "stances of the crops of turnips obtained by manur- "ing the ground in this way: particularly of a Mr. "*Richardson* in the Wolds, a tenant of Lord Yarbor- "rough's, who has long practiced the method of *spread- "ing straw* upon fields prepared for turnips, and *set- "ting fire to it*, thereby raising crops *superior to those "afforded by the usual portion of dung*. The quantity "of straw he makes use of (for an acre) is five tons; "let it be supposed then, that these five tons of straw, "were turned into five tons of dung (which is a large "allowance) those five tons of dung would make ten "good car-loads;* a quantity not sufficient for the "fifth part of an acre.† The same gentleman found "not only the *turnip crop better*, but the *barley also*, "*than what followed from the manuring with dung;* "and he is clearly of opinion, that it is the warmth "from the FIRE that has the effect, and not the ashes; "for the quantity is nothing, and would be blown "away by the first blast. This *straw-burning husband- "ry*, Mr. *Young* found again at Belesby, practiced by "a Mr. *Lloyd*, an excellent farmer, who thinks that it "will take six tons an acre, which will *last longer in*

* An Irish car is much inferior, in capacity, to one of our one horsed-carts.

† The *Irish* acre is larger than the *English* statute acre. The number of poles is the same; but the *Irish* pole is twenty one feet; whereas the *English* pole contains only sixteen feet, six inches. So that the *Irish* acre is one acre, two roods, and nineteen perches, *English*.

"*its effect*, and *beat the dung the straw would make.* "The Rev. Mr. Allington, at Swinop, has cut gorse "*(whins)* and burnt it in May, for turnips; it also "answered well;—the effect great on the turnips,— "on the barley better. In *Gascony*, and almost to *Ba- "yonne*, Mr. *Young* observed the same mode of ma- "nuring for *raves*, a sort of turnip, in use there. A "similar mode of manuring has been, a length of time, "carried on in the north of *Ireland*, though with a dif- "ferent and more substantial material; it consists in "drawing the crumbly and friable parts of boggy "grounds, to the gravelly or clay fields, in summer; "then spreading it, until it becomes dry; afterwards "gathering it in small heaps, *setting it on fire*, and "whilst it is flaming, spreading it on the grass. The "effect of this on the grass is great, also on the suc- "ceeding crop. If it were used for a fallow crop, there "is no doubt the advantage would be much greater, "and more permanent. *Whins*,* I know to be a "most excellent plant." &c.

I was gratified when I met with this confirmation of an opinion I have long entertained.—Very long before I saw Mr. *Young's* CALENDAR, or this book. I have no sympathy in feelings like those of *Dennis* the critic; who was enraged when he was told of an old author, who had anticipated opinions professed by him. He was accustomed, on such detections, to execrate the

* *Whins*—Furze, or Gorse. *Genista Spinosa* of Ray; *Ulex* of Linnæus.

ancients; and accused them of having stolen his best thoughts! The pleasure I experience in the coincidence, arises from the opportunity it affords of promulgating the practice, under authorities better than my own. I have, very often, burnt brush, on patches intended for melons, under the idea that it would destroy the eggs or *larvæ* of insects, which would otherwise infest the vines. It always had the effect I wished. But I have observed a fertility in such spots, for years, beyond those in their vicinity. I have burnt the stubble (too thick to plough in) on a wheat field, generally; but have left some spots unburnt and ploughed in. The buckwheat, sown on the burnt stubble, was strikingly superior. Clover, sown with the buckwheat, was by far the best, the next season, on the burnt parts.*

It is in the power of every farmer, to turn to his advantage, the nuisances and pests on his farm. Very probably some lands will be more benefited than others, by this operation. Every kind of manure does not operate alike on every soil. The experiment will cost little; and the materials for trying and extending it,

* This was before the excellent practice of sowing clover on our wheat, was introduced. I generally, *then*, ploughed in the stubble, to rot as a manure. But, *now*, I cut the clover and stubble; and have great store of fodder for the barn-yard cattle. What they do not eat, becomes manure. My fields are left in the best condition, for either feeding or mowing, the next season. I have heard objections to mowing the clover and stubble; as rendering the roots exposed to injury by droughts or frosts. But I am convinced, by long experience, that, if the cutting be in proper time, there are no solid grounds for such objections.

are every where to be found. A neat and managing successor to one slovenly and negligent, will be rewarded for his exertions, by burning on his fields the incumbrances left by his careless predecessor.

I do not mean to say, that burning of land may not be carried too far. Extreme cases prove nothing. Like wagers, they are often the *ne plus ultra* of controversy; when argument is deficient. A certain quantity of *lime* is salutary; but an overcharge is destructive. Some soils will bear, and require, heavier liming than others. Soils differ in their capacities, textures and qualities, so as to be injured or ameliorated, as much when FIRE is applied, as when any other manure or auxiliary is used. The use or abuse of FIRE must be discovered by experiment; as must any other operation in husbandry. And, certainly, the safest mode is, to begin moderately; and increase or diminish, as experience dictates. I add, however, that I never yet saw an instance, the one hereafter mentioned excepted, where injury had been done in this way; although I have myself cleared much land, originally; and burned vast heaps of timber and brush, both on new and worn lands.* Yet I have one decisive proof of the in-

* Our correspondent, Mr. *Lorain*, [pages 112, 113,] condemns what is called the YANKEE mode of clearing new lands; preferring the *girdling method*. [for an account of which, see our list of premiums; Vol. I. pages xlii, xliii.] This is not a place to enter into that subject; with which I profess to be tolerably well acquainted. It is the vile mode of farming (common to both)—scratching with harrows only, stubbling in crop after crop, of culmiferous plants; where it is not left under grass choked with nuisances,—and not the FIRE, which merits the severest condemnation. Neither mode

jury occasioned by over-burning land; which may be deemed an extreme case. More than sixty years ago, the bricks, whereof the walls of my house are composed, were burned in a kiln, the site whereof is now in my garden. I have, in vain, endeavoured, at various periods, to recover the fertility of this small spot. Two years ago, it was limed. Last year, I selected the best well rotted dung; and applied it plentifully. I planted on it, this season, for experiment, Indian corn, scarcity roots, cauliflowers, and water-melons. The culture has been the same with that on other parts of the garden. But every plant is inferior, most perceptibly, to other similar plants, on other spots; and so it has invariably been, with plants on this over-burned soil.

Your very obedient servant,

RICHARD PETERS.

DR. JAMES MEASE.

Secretary of the Philad. Agric. Soc.

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of clearing is a good one; but I think the *Yankee* mode the best; and when it is faithfully and carefully pursued, it is unobjectionable, on the account noticed by our correspondent. Both methods are pursued from necessity; and are such as the state of things, in a new country, imperiously, and probably exclusively, demands. Mr. *Lorain* deserves much praise, for investigating a subject of primary importance in our new countries; and one which, hitherto, has been too little noticed, or discussed. R. P.

On well-rotted Dung. Fresh and hot Muck. Stercoraries; and their Uses, by Richard Peters, Esquire.

Read September 14, 1813.

Belmont, August 22, 1813.

Sir,

Having frequently had occasion to mention my opinion respecting the state in which *dung* is most proper for use; I take the liberty of explaining my meaning on that subject. If my theory be even unsound and dissatisfactory, it may at least lead farmers to *think* on a topic, on which their interests materially depend. My experience warrants the statement I have given. If the experience of others be different, they will, no doubt, be governed by their own knowledge of facts; which, in such cases, are the safest and most certain guides.

The dung should be applied when it is *well-rotted;* —that is, before the fermentation has ceased,—yet when it is so far advanced, that the texture of the parts is destroyed; and all seeds contained in it are completely putrescent, and incapable of germination. I am convinced, by long experience, that muck, or dung, in the latter stages of putrescence, is in the best state of salutary efficiency; and most proper, on every account, for application. Carbonaceous, over-rotted dung is of little service. What in grammar, would be called the *penultima*, or *antepenultima*, is the most preferable stage of its progress to putridity. There is an important distinction between *putrescence* and *putridity*. The

violent and outrageous operations of fresh and hot muck, (acting as well on the pests it brings along with it, as on the crop it is intended to stimulate and nourish,) are as ungovernable, and often as morbid, exhausting, and mischievous, as are the unrestrained, though temporarily potent, exertions of one making enfuriated and desultory efforts, under the paroxysms of a fever. Sometimes its fury is spent on itself. Whatever may be its success in *Europe*, (where opinions are divided, but the majority against it,) *our* ardent heats assist in its consumption. I have ploughed it in very deep; and, after a long drought, turned it up entirely dry rotten. This may be often observed in the litter, or strawy muck, frequently applied for potatoe crops, and the myriads of mice and moles infesting them, are fatally known.

I am not convinced by the argument I have often heard;—that the strength of the "dung had better be applied in throwing up a crop, than wasted in the muck heap."

Whatever be the food of plants, there is an evident analogy between the structure of their parts, and that of animals. The food for both must be in due preparation to enter the vessels, before it can have a salubrious effect. The violent fermentation necessary and preparatory to making bread, is most suitable for the dough-trough. None would venture to recommend this preparatory operation to be carried on in the stomach;*

* See Vol. I. pages, 235, 236. Where instances are mentioned of previously fermented and baked provender, being given as food for horses; alleged to be more nutritious and economical, than

or successfully contend, that it is uselessly employed, or wasted, in its proper place. True it is, that a fermentation, more gentle and profitable, must proceed in the natural ventricles, allotted for fitting all food, after it is duly prepared, for entering the system of animals. I should presume, that the analogy requires similar circumstances, in regard to plants. The *stercorary*, and not the earth, seems to be the place of preparation of what is to become the food, or stimulus to the growth, of plants; for we know not, correctly, the *modus operandi*. After such preparation, and not before, it is fitted for the place of final deposit;—to wit,—the ground in which the plant is to grow.

Strength of manure, as it is called, amounting to force and violence, is not desirable. It has an indiscriminate, partial, and irregular impetus; very different from constant, durable, and wholesome endeavours. A heated, overflowing, and rapid circulation, occasioned by the violent operations of hot muck, bursts the vessels of the most valuable plants; and produces, in grain-crops, smut, blight, and mildew; or loss, by laying, of over-abundant straw. Weeds, and vermin are generated, increased, and invited by it;

raw meal, or grain. This analogous illustration, may be deemed a mere fanciful speculation.—Be it so.—I rely on *facts* to which my attention has been called, through many periods of my life. The subject has always produced differences of opinion and practice, among farmers; from the time of my earliest recollection. The great majority have preferred well rotted dung. But few, indeed, have paid sufficient attention to the all-essential uses of the stercorary.

—beyond all comparison with that having previously undergone a proper degree of fermentation and decomposition. And it is indubitably true, that the duration of dung operating violently, is shorter; and leaves the ground in worse condition; than that duly and moderately rotted.

I know, that some men of intelligence, differ with me on this subject. But I must, with all due deference, be permitted to form conclusions (for myself) from facts with which I have been long acquainted. Truth is the result of facts *generally* occurring; although there may be some exceptions, and contrary evidence.

I have taken it for granted, that most of the advocates for the use of fresh muck, plough it in. But I have heard of those who practice hauling it from their stalls, or stables, without fermentation; and thus spread the litter, on grain, or grass!* As a cover, to

* See Vol. II. "On Plaster of Paris." Note, page 78. Well rotted dung, or compost, as a top dressing, is there approved. But this kind of raw cover is of a very different nature. All top dressings are better for grass, than grain.—In addition to many precedent experiments, I allotted two contiguous stripes, of about forty feet wide each, in my wheat field, sown last autumn, for the purpose of comparison. On one, I ploughed in a liberal allowance of excellent dung. The other, I top-dressed, plenteously, with the best selected dung. On the strip ploughed in, the wheat was strikingly superior. But the grass, (orchard and some clover,) from seed sown on the wheat, was, incomparably the best on the strip top-dressed. The results of many similar experiments, have been uniformly so with me. Tenants, careless about permanent improvement, spread, superficially and thinly, their manure for a present purpose. But those who wish to prolong its efficacy, should, in quantity sufficient, plough it in. R. P.

protect the crop from bleak winds and frosts, (deducting the evils accompanying it,—i. e. affording harbour for vermin, and sowing the pestiferous seeds contained in the litter,) it may be serviceable; and, in the parts consisting of alvine-ejections, *some* manure may be afforded. But the evaporation must be dissipated more uselessly than it is said to be in the stercorary; and but a small proportion of its efficacy can be applied to the crop. In some instances whereof I have been informed, this cover has had the credit of producing great crops. I never doubt facts alleged by men of integrity. But I cannot avoid expressing my surprise, that this wasteful mode of application should be advocated. If the straw-burning husbandry be as efficacious as it is said to be, it would seem, that the straw of the litter thus spread, independently of its use as a cover, would be more serviceable, if burnt on the ground. I leave, however, the friends to the system of hot or fresh muck-husbandry, (among whom, it seems, there are sectaries) to settle among themselves, the mode they deem the best. Abstract reasonings on a subject capable of proof by practical tests, are seldom satisfactory. The balance of facts, not solitary instances, must finally decide all questions relating to it.

How this premature use of the materials essentially required for increasing the store of manure, can be justified on a principle of economy, and "getting all the good of one's dung," as some have expressed themselves, I cannot perceive. The animal excrementitious matter is not merely estimable and operative in itself; but its value and efficacy are extended, when,

in a well conducted *stercorary*, it converts other substances into manure. Weeds, offal, earth, and innumerable articles, otherwise not only useless but nuisances, may be turned into valuable manure; by being fermented and impregnated, by means of the animal ejections with which they are mixed. Time is required for the process of putrescence; and this time is denied, by a too early evacuation of the dung-pen. The dreams, or the labours, of alchymists, certainly have never realised, if they have even imagined, so much treasure by transmutation, as well managed stercoraries are capable of producing. But removing from them, prematurely, the foundation of their utility, is at once blowing out the furnace. Whatever justification there may be for using the earth as a laboratory, by ploughing in the muck; it would seem, that spreading and exposing what I call the raw material, on the surface; is entirely without reasonable excuse. Yet I have known men, on whose judgments, in other matters, I should rely, not only defend, but persist in the practice; although it effectually supersedes, as the former custom curtails, the use of that all important repository,—the *stercorary*. This indispensable magazine is too little attended to. Yet it is to the farmer, what his dam is to the miller. The process of fermentation and decomposition, is as needful in the preparation of the materials essential to his art; as it is to the distiller, and the brewer, in their respective occupations.

I have not, in the imperfect discussion I have entered into on this subject, had any anxiety, on a personal account, to establish my own opinions. But I feel a strong desire, that it may be well considered; and that both sides of a question, in which the prosperity of our agriculture is so deeply involved, should be fairly examined, and deliberately investigated.

Yours, very truly,

RICHARD PETERS.

DR. JAMES MEASE.

Secretary of the Philad. Agric. Soc.

POSTSCRIPT.

I add the following as a POSTSCRIPT, to my communication on *muck, and rotted dung*.

As long as opinion is subject to variety, differences of sentiment, on the subject of fresh muck, and rotted dung, will exist. I do not enter the field as a controversialist, but as a narrator of my own experience. If in doing this, I have wandered into reasoning on causes, or theories; facts must, nevertheless, decide all questions.

Since the date of the foregoing communication, a collection of agricultural essays, entitled ARATOR, by a citizen of Virginia, has been put into my hands. It is attributed to a citizen of that state whose talents I always respect, and whose facts I do not, in the smallest degree, doubt. He is an able advocate for the use of long and hot muck; and the earth, not the stercorary, is his laboratory. The constituent parts of his manure, exposed in open pens, till it is hauled into his fields, early in the season, are, in no small proportion,

the offals of Indian corn. He cuts off the whole stalk (as many of us do, and all ought,) and uses it for litter. He does not intermix the cobs among his muck. These I always rot down in the stercorary. He strews plaster on his muck, before it is ploughed in;—than which nothing more efficaciously promotes putrefaction.* See

* Theories are unimportant, when compared with facts. An able chemist and mineralogist alleges, that an experiment had been made here to test the conjecture I hazarded, in my compilation on Plaster, that the *sulphuric acid* was the cause of operation in the Gypsum. The experimenter had found no reason to believe my conjecture to be correct. He, therefore, concludes my idea to be unsound, and unsupported. He substitutes *another conjecture* in place of mine; i. e. that it operates as a "*septic to dead fibres; and a stimulus to living ones.*" On subjects merely chemical I enter not the lists with chemists. The fields of the farmer are far the best expositors. On these I have tried many experiments, on scales both small and extensive, with a view to my theory. In some I have failed; but have so often succeeded, that the ballance has fixed my opinion. Still subject to the controul of more able experimenters. Plaster is good or bad according to the proportion of the sulphuric acid, or oil of vitriol, in its composition. Forty eight parts in a hundred, are the proportionate quantities in the best plaster. It operates with less of this acid. But it requires more in bulk, or total, of the matter containing the acid, accordingly as the requisite proportion is deficient. The acid has been detached, and the earth, &c. in which it had been detained, strewed; without the least agricultural effect. To produce any important effect, an enormous quantity of this earth would be required.

It is far from my intention to enter into controversy; or to hold out pretensions to chymical acquirements. I think, that causes of operation, however desirable the knowledge of them may be, are, most commonly, subjects of *mere conjecture;* as I still (however confident I may appear) continue to consider the one assigned by me. Probably, having assigned it, I may have yielded to a bias

Vol. II. Plaster of Paris, page 44. No material yields

flattering to first impressions; which is not singular. But I do not stand alone in believing; and actual results of frequent experiments, give me strong grounds to support such belief; that *sulphur* in its crude state, and its offspring the *sulphuric-acid*, are, of themselves, operative in promoting vigorous and healthy vegetation. See Vol. II. page 206. Same; *On plaster of Paris*, 92, 94, 95. Whether they act merely as septics, or stimulants, or both; or in what way they operate, I do dot presume, peremptorily to decide; though I have strongly urged an opinion. But it is of indispensable importance to know, what are the component parts essentially required, to constitute *good* plaster. The fallacy of experiments, too, I am practically convinced of; having myself failed in so many. Yet I never presume, that my success, or failure, is the test of truth. Times, seasons, state of atmosphere, quality and situation of land, differ so materially, that experiments may fail at one time, and at one place, which would succeed at others. In the year 1772 (more than forty years ago) I began the career of plaster. In this long course of time, I have never ceased applying it. I have experienced numberless failures and disappointments, from the best *gypsum*, on the most suitable soils. This season, with me, has been so remarkably unfavourable; that, had I exclusively to decide on its efficacy, on the results of this year, I should really pronounce the plaster worthless and inefficient. Yet I know the quality of that I used, to be perfect; and the soil exactly suitable. On some other farms, it has succeeded as well as is common. I therefore conclude, that no decisive opinion ought to be formed, from the experiments of any one person (including myself in this remark) or those tried at one place, or in one, or two seasons. It is fortunate, however, that we have a cloud of witnesses to practical results. If causes remain hidden, ingenuity and science may continue their speculations. But farmers (among whom alone I class myself) have long experience in practical proofs, to animate them, in their unhesitating reliance on this invaluable substance.

R. P.

more valuable manure, when rotted, than corn stalks. The mode he takes in earthing over, and using the raw materials, appears to be perfect. His covering the muck, by deep ploughing, as fast as it is hauled out, seems highly proper for his system. But seeds deeply buried, are not always destroyed. They will often vegetate on the first exposure. Aware of the necessity of meeting the fermentation of his muck, with a powerful plant; his Indian corn crop stands the brunt of the battle. It is the only plant I know, (*potatoes* excepted, if they be not caught by a long drought) fit to encounter the assaults of fermenting muck. It will thrive among *lime*, the first season of spreading; when wheat would perish. *Wheat* (I fear sown among the corn) is his second line, of less able bodied troops. The fermentation is nearly over, and the conflict less dangerous, when this crop takes the field. He seems conscious, that the force must be previously weakened. So far do we differ in nomenclature, that he considers what I deem a foe, to be a friend and ally. And so it certainly is, after due subordination is established, and all hostile propensity subdued.

Whatever difference of opinion I may entertain on this particular subject, I cheerfully recommend a perusal of the *agricultural* principles and observations in this collection; as being well worthy of the attention of all farmers in every district of our country. Other subjects therein discussed, I enter not into.

It will be seen, that I always conceived some process of fermentation and putrefaction necessary to disengage the gases supposed to be the food of plants. See also 2d vol. *Plaster* of *Paris*, 94, 99. But an

overcharge of any of these, is certain destruction to a less powerful plant than Indian corn; and, not seldom, even to this. In our *hot beds* the evaporation of hot muck, however well covered with mould, or rich earth, unless suffered to escape; by frequently opening the glass covers, will kill the strongest plants. This I have repeatedly suffered under, through the carelessness of my gardeners. The heat and evaporation must subside, before we dare plant our hot-bed vegetables. Every species of our common field-plants, have been killed or stunted, by mephitic exhalations, or the drainings of stercoraries. Yet when weakened, by sufficiently diluting them, nothing can be more salubrious than the latter. EXHALATION is the great foe, ARATOR constantly combats, watches, and studies to defeat. Yet I do not fear it, in a well conducted stercorary, or compost heap. It is, in fact, nothing equal, in volume or compound, to the waste he imagines. I doubt whether he ever made a fair comparative experiment. I think the loss, by the common and inevitable exhalation of stercoraries, which can be, in a great degree, restrained; is, in profitable result, a gain. The superabundant *azote*, and poisonous qualities of the muck, escape; and the residuum is more than worth the whole mass. It may not spread over a space so extensive. But "*exiguum colito*," has always been my motto.

After all,—whatever may be the correctness, or mistake, in the opinion I entertain, as to the qualities of the dung; I do not presume to enter into the *expediency* of the mode adopted by ARATOR. He is the best judge of the circumstances, in which *Virginia* farmers

are placed, on the large scope they occupy, in their husbandry. These may overbalance all objections, even if well founded, as to the state of the material, when it is used on their lands. I am now *hors de combat*, in extensive farming. Were I to begin my course over again, I should follow, in this regard, the practice my past experience justifies. I should be utterly fearless of any competition with hot-muck-farmers; on the scale to which we are accustomed.

If my apprehensions of violent fermentation, and its noxious effects, and the concomitant pests of weeds and vermin, be deemed extreme, and my ideas of the less injurious consequences of evaporation, and loss, by rotting of muck in the stercorary, be thought below the mark;—so let them be. I have not been without repeated proofs, and comparative experiments, to satisfy my own mind. Our muck, it is true, is chiefly composed of straw, offals of hay, and the weeds and coarse grasses intermixed; to which we add, in the stercorary, all the animal and vegetable putrescible substances we can obtain. *That* in *Virginia*, as I understand, consists, for the most part, of corn stalks and remnants of blades; and may not be liable to all the consequences enumerated. If the author of ARATOR be the one suggested to me, he will give his plan a fair and persevering experiment. Any improvement in husbandry is highly meritorious; and more particularly so in a country which has been, (so far as I have been informed,) for a long course of time, stationary, in a course of Agriculture not *generally* worthy of praise. He has, on his side, the justly celebrated *Arthur Young*, than whom he could not

have higher authority. Although I have thought Mr. *Young*, from the most laudable motives, over zealous on this and some other subjects, I entertain so exalted an idea of his talents, and long, faithful, and invaluable labours, in promoting the agricultural interests, not only of his own, but of every country; that it is, in no small degree, painful to me, when I am compelled on any occasion, to differ on a subject in which he is decidedly an advocate for a contrary opinion. See Vol. II. p. 172. 204.

It may be said, that my ideas of the noxious qualities of fermenting muck, can only apply to *summer crops;* as the fermentation and heat are spent, before they can affect the straw, or seed, of *winter-grain*. But this is fully answered by the case hereafter mentioned; and, to *my* additional satisfaction, by my own experience. It appears, that it infects the ground with durably deleterious taint; instead of fertilizing it with wholesome capacities.

When I speak of *stercoraries*, I mean *covered* repositories. Better with roofs; but well enough with a proper thickness of earth. I am as inimical to exposed muck, as any of the muck-farmers can be. Perhaps stercoraries thus constructed would be baubles, in the estimation of *Virginia* farmers, on their large scale. Our farmers frequently plough up (deeply) the head lands of the field intended for wheat, (never sown among corn, by prudent husbandmen) and hale out their muck early, on the head-lands; which afford loose earth, to mix with, and completely cover, and rot down sufficiently, the manure for their crop. This is found highly beneficial.

Three years ago, I used, from necessity, unrotted litter, for potatoes. I was punished for my aberration, by a most terrific and profuse growth of the *May-weed*, or *Daisy*, the seeds whereof had been among the muck. I am scourged by this vile and exhausting pest; which I cannot subdue without great exertions; and, with them, not entirely; unless I hand-weed. Like a slave flagellated by his driver, I revolt; and my hatred is increased by every repetition of the lash. This season, I have sacrificed a fine sod of timothy and clover, infested by the *Daisy*, which I have ploughed under, with another potatoe crop. With this I shall defeat the foe; attacked before becoming a veteran.

Many years ago I met, in one of the agricultural publications of either Great Britain or Ireland, a most convincing proof of the bad effects, and ruinous consequences, of an inveterate attachment to the hot muck system. I have it not now in my power to lay my hands on the book; which was one of indubitable authority. It is really a strong case in point; and made an indelible impression on me.

A nobleman of large property, who kept a numerous stud of horses, leased part of his estates to a full handed tenant, who brought, on the estate leased, several thousand guineas. A part of the contract was, that the tenant should have all the muck of his lordship's stables; in consideration of his furnishing all the straw required. This contract was complied with; and, through a course of many years, the tenant applied the fresh muck to his fields. He rarely, if ever, reaped a clean and healthy crop. Smut, blight, mildew, or

laying of his grain, were continual. He finally became a bankrupt, though not deficient in industry; and in other matters intelligent. The estate was again offered for leasing; but was not readily taken. At length, one, accounted daring and adventurous, leased the estate, on the same terms with the former unfortunate tenant. His ruin was predicted. But he was aware of the mistake, into which his predecessor had fallen. By a judicious course, he cleansed the polluted fields; to which, for several years, he applied no more dung. The muck from the stables was composted, and sufficiently rotted; before it was used for any crop. To the astonishment of all the foreboders of his fate, he never had an infected crop; and made what was deemed a fortune.

By potatoes and frequent ploughing (in Autumn and early Spring) I have conquered the pest I mentioned in our 2d Volume, 178;—the *Star of Bethlehem*, or *Ornithogallum umbellatum*. This had alarmed me more than any other weed I had encountered. The bulbs were brought into my field, among unrotted litter from my garden.

Your very obedient servant,

RICHARD PETERS.

DR. JAMES MEASE.
Secretary of the Philad. Agric. Soc.

Addition to the Note on GYPSUM. *Pages* 228, 229.

Having seen, since my note on GYPSUM was put to press, a work (about being republished in Philadelphia, by Mr. *John Conrad*, &c.) deserving encou-

ragement,—Sir H. DAVY'S ELEMENTS OF AGRICULTURAL CHEMISTRY;—I cannot refrain from adding to that note; although I may not be justified by the importance of my observations.

When the paper of Mons. *Berard* (see Vol. 2d, 206) on the "*Efficacy of* SULPHUR, *as a Manure*," was shewn to Mr. *Davy*, he observed to a friend of mine, who related to me the circumstance, that he expected he should soon prove, that Mr. *Berard* was mistaken in his ideas of the operative causes, both of *Sulphur and Plaster*. I confess my curiosity was strongly excited, when I saw Sir *H. Davy's* work announced. I have the highest opinion of Mr. D's talents as a chemist, and able investigator, into all subjects he undertakes. But I was completely disappointed, in all my expectations on the subject of *Gypsum;* whatever may be their weight with others. It most assuredly appears, to me, the least satisfactory of any part of this estimable and popular performance; and causes me to despair of any profitable assistance, in this *desideratum*, from the most eminent chemists. Little or nothing (so far as I am capable of judging) can be collected from it, decisively settling any useful question. To us, who are so well, and have been so long, acquainted with results, that we need no further experimental speculations; the facts or conjectures, are really unimportant. What I expected to see luminously treated (after what I had heard) is either not touched on, or by no means (as I conceive) proved. He finds *Gypsum* (its component parts not mentioned) in all animal manure, grasses, and in the earth of cultivated, as well as soddy, fields. When the plaster strewed does not operate, it is because there "*is enough in the land*," or in the animal manure, or grasses, *precedently*. Yet *we* find that it will, and often will not, operate, where there is no probability of any similar substance having been; owing to manure, or other cause he assigns.—In the barrenest and worn fields; destitute of almost every *living* plant: and sometimes it fails, or succeeds, on grounds of the opposite description. If *there be enough* (as he supposes) to nourish a meager grass; yet, we find, adding more, will make a starved plant vigorous; or substitute a better in its place. And if there "*be enough in the land*," *or* "*in the plant;*" why does the one remain steril, and the other starved?

If it be true, as some allege, that *dew*, in great proportion, rises out of the ground; and there be "*enough Gypsum already in the soil;*" why does it not overbalance the trifling addition superficially spread; and detain the dew, or moisture, from rising? If the gypsum spread be, (as the fact of superficial moisture, drawn out, *non obstante* the alleged gypsum in the earth, seems to designate,) *differently composed* from that in the soil; one can account for the circumstance. I never saw plastered ground, which did not exhibit profuse moisture, superficially. Whatever kinds of calcareous, or other, matter, be in the soils of other countries, are to be found in our ground; notwithstanding any opinion to the contrary. It is in this, and every other, respect, like the soils of other parts of our globe, almost infinitely various. This *conjecture* seems, therefore, quite as inexplicable and theoretical, as any other can be.

He denies its *septic faculty*, or capacity to promote

putrefaction of animal substances; or to decompose manure. Yet we know, from thousands of instances, that it does both;—freely and amply. It is, too, well established, (see Sir *John Pringle's* experiments) that some septics (whether plaster be one or not I do not allege) operate differently on animal and vegetable matter: so as to preserve, or not affect, the one, and putrefy the other.

He says, its capacity of attracting moisture from the air, in any important quantities; or its adhesive attraction for it, is "insignificant and inconsiderable." Yet *we* have daily evidence, to shew, most palpably and decisively, and even every farmer's boy, who drives his cattle to and from their pastures, can prove *by his feet*, without speculating on causes, that dews and moisture are constantly and profusely retained on plastered fields, for hours, in the early part of the day, after they have passed away from grounds, on which the plaster had not been strewed. If, as he alleges, when combined with water, "it retains that fluid too powerfully to yield it to the roots of the plant,"—how can we account for the superior strength and verdure of grass bedewed with the moisture attracted, and retained from evaporation, on plastered grounds; compared with those adjacent, on which no *Gypsum* has been strewed? The same difference in the *roots*, and the whole of the plants, is strikingly perceptible:—either in adjacent fields, or strips, purposely left unplastered, in the same field; in which Mr. D's natural store of *gypsum* must have been equally deficient, or distributed? In the evening, too, the dew on plastered ground is the soonest perceived. Until

the English acquire more experience in the use of plaster, we shall, I fear, derive little benefit from the speculations of their most scientific writers on this subject; however instructive they may be, and certainly are; on other agricultural topics.

The *sulphuric acid*, or *oil of vitriol*, is known to possess the faculty of attracting, and being diluted by, *water*, in an uncommon degree: and the solvent power of water is well established. What other parts of the *gypsum* has, so peculiarly, this property? If the *sulphuric acid* does not produce the effect on vegetation, as stated in my conjecture; there is no other part likely thus to operate.

All substances containing this acid, operate alike on vegetation; and *that*, as I have reason to believe, according to the proportions of the acid included in them: and, although these substances be totally variant in their natures.—To instance only a few;—

1. The PLASTER OF PARIS, we use, consists of *calcareous earth;* mixed, irregularly, with other earths: and the *sulphuric acid*, combined with them, is in the greatest proportion of any other part of the mass.

2. The PYRITES are a genus of inflamable substances, composed chiefly of SULPHUR; which has dissolved, or saturated itself with, METALS; oftenest with IRON. It is the principal *ore* of *sulphur*. The use of this, when calcined, or burnt, as *a manure*, occasioned Dr. *Priestly* to mention to me, what I relate in Vol. I. page 158. And see appendix to Vol. I. page 32.

3. BARYTES, is an ALKALINE EARTH. It possesses strong and peculiar attraction for the *sulphuric acid*. It will always detect its presence, in any substance;

and immediately unite with it, and form a SULPHAT. This renders it a very valuable chemical test. That this is a most *powerful manure*, (though, that it may be the more readily decomposed, it must be reduced to a *sulphuret*,) is clearly proved, by our intelligent correspondent, Dr. *Isaac Chapman;* page 120, of this volume.

Strange, then, (to one of the *Lai-gens*,) that this common property of possessing the SULPHURIC ACID, should go for nothing; and other causes of operating on vegetation should be sedulously sought for! If my *conjecture*, (whether original or borrowed, I cannot myself now tell) should really be, as some respectable chemists deem it, unfounded; I see not that those they have substituted, (opposite and variant) have more fact, or probability, to support them. It is of no other consequence to farmers,—than that it will furnish a guide to discover what substances are likely to be operative on vegetation; until a more certain index be established. Mean time, a conjecture which has been, and may be, practised upon, seems to be,—to say no more of it,—quite as good as any other.

It is practically well known to multitudes of farmers here; to me particularly, who have been the longest acquainted with this substance;—that, in proper soils, and in places free from constant moisture, and not impregnated with, or affected by, common salt, either in the earth or atmosphere; the plaster operates, or not, accordingly as *decayed vegetable, or putrescent animal matter*, is, or is not, found in the soil. If none such originally exists, or becomes exhausted, one or the other must be supplied, by green-manures, dung, (in

moderate quantities,) ploughed in, or compost as a top-dressing. With such auxiliaries, the plaster works vigorously; either when first strewed, or on repetitions; however frequent. Without them, it lies inert and useless. The fact is well established; be the theory what it may. Anomalous exceptions sometimes occur. But these do not shake the general rule; which is, in practice, as much [illegible] course, and as commonly successful, as any other operation in husbandry.

R. PETERS.

September 25, 1813.

Colonel Pickering, on Hedges.

Read September 14, 1813.

Wenham, Mass. August 13, 1813.

Dear Sir,

In the 2d volume of the Memoirs of the Philadelphia Society for Promoting Agriculture, is published the letter I wrote you from Washington, in 1809, on the subject of hedges. As you are printing a third volume, I wish, in this communication, to correct two errors in that letter, in which I refer to Lord Kaims and Dr. James Anderson, on the same subject.

Thorn Hedges.

Expressing my doubts, from what I had read, whether the English thorn-hedges constituted complete fences; especially as it seemed to be a common practice to introduce *trees* into them; I then mentioned Lord Kaims as "expressly saying, that he never saw a good hedge in England." Not having his book (The Gentleman Farmer) by me, I trusted to my recollection. This I afterwards found, as to the precise terms used, to be incorrect. Lord Kaims says—"there never was a good thorn hedge with *trees* in it;" and that "in England there is scarce a thorn-fence to be seen without a hedge-row of trees; and these hedge-rows (of trees) have been the destruction of fences." Your own observation on English hedges, which you had seen, corresponded with the idea I had

formed of them from their books, that they were far from being complete fences.

Lord Kaims proposes a method of training thorn hedges similar to Dr. Anderson's; and describes a comparative experiment he had made, during a period of twelve years, of three modes of rearing thorn hedges, in which that of *leaving the stems uncut*, until they had attained sufficient stability, appeared to be decidedly the best. His book being in the hands of few persons, I here transcribe the passage referred to, as highly interesting to all who would make hedge fences.

"I have the experience of three hedges trained twelve years as follows. The first has been annually pruned top and sides. The *sides* of the second have been pruned, but the *top* left entire. The third was left to grow without any pruning. The first is at present about four feet broad and thick from top to bottom; but weak in its stems, and unable to resist any horned beast. The second is strong in its stems, and close from top to bottom. The third is also strong in its stems, but for two feet up bare of lateral branches, which have been destroyed by the overshadowing of those above, depriving them both of rain and air. That the second is the best is ascertained by experience. And that it ought to be so, will be evident if we trust to analogy. In the natural growth of a tree, its trunk is proportioned to its height: lop off the head, it spreads laterally, and becomes a bush, without rising in height, or swelling in the trunk. The lime tree is the only exception I know: the white thorn I am certain is not an exception. Hence the following method of train-

ing up a hedge; which is, to allow the thorns to grow without applying a knife to their tops, till their stems be five or six inches in circumference. In good soil, with careful weeding, they will be of that bulk in ten or twelve years, and be fifteen feet high or upward. The lateral branches only must be attended to. Those next the ground must be pruned within two feet of the stem: those above must be made shorter and shorter, in proportion to their distance from the ground; and at five feet high they must be cut close to the stem; leaving all above full freedom of growth. By this dressing, the hedge takes on the appearance of a very steep roof; and it ought to be kept in that form by pruning. This form gives free access to rain, sun and air; every twig has its share, and the whole is preserved in vigour. When the stems have arrived at their proper bulk, cut them over at five feet from the ground, where the lateral branches end.—A hedge trained up in this manner, is impenetrable even by a bull; he may press in the lateral branches; but the stems stand firm.—Good thorns are more essential in this manner of training a hedge than in any other: they ought all to be of an equal size and equally vigorous, that they may not overtop one another." See part I. chap xii. on fences.

In Great Britain, hedge-fences are generally accompanied by ditch and bank: principally (I presume) because the ditch and bank, aided by a slight railing, make an immediate fence; and because in flat grounds ditches serve for drains. But in America, where wood is yet sufficient in quantity for complete fences, while the hedges are growing; and where, too, we are subject to heavier rains, which cause destructive gullies; doubtless Mr. Maine's mode of plain hedging, without ditch and bank, is most eligible.* A ditch is an artificial gully, which, in sloping grounds, every considerable rain must mischievously increase.

The Larch Tree.

The other error that I wish to correct respects larch trees. It was not Dr. Anderson, in his essays on Agriculture, as I stated, but Dr. Hunter, in his notes on Evelyn's Silva, or Discourse on Forest Trees, who mentioned the larch as growing fastest in the poorest soil and bleakest exposure. After observing that the larch was a native of the Alps and Appenine Mountains, and had become common in the nurseries of Great Britain, he says—"It is remarked that these trees which have been planted in the worst soils and most exposed situations, have thriven the best." Dr. Anderson, on the contrary, after stating the rapid growth of some larch trees planted when only from six to nine inches high, which in twelve years had reached the average height of from 34 to 36 feet, remarks that "this plantation was made on a very good soil, and favourably situated." At the same time he says "the larch may be made to grow upon almost any soil, even from a stiff clay to a barren sand, if not drowned in water."—I have two native larches growing among white pines and maples, in a moist, peaty earth. They

* This practice of Mr. Maine is not original: Marshall mentions and commends it, in his Rural Economy of Yorkshire, where he observed it in 1782.

arc about six feet in circumference and perhaps eighty feet in height. The very great value of the larch tree for timber seems to have been little understood in Great Britain, till within a few years past; and I believe that but few persons have any knowledge of it in the United States: yet doubtless it is one of the most useful trees that could be raised. Dr. Anderson's excellent directions for making plantations of them, are to be found in his third volume of Essays on Agriculture and rural affairs. Scotland, so remarkable for its nakedness in respect to trees, they are now covering with the larch. Dr. Anderson says that for many years, one person (the duke of Athol) had been in the practice of planting out from his own nurseries, one hundred thousand larches annually; and the doctor himself above two hundred thousand, for the three years before he wrote.

The Common Locust Tree.

In your first volume of Memoirs is a communication from Caleb Kirk, near York in Pennsylvania, in which he says, that after trying various trees and shrubs for hedges, "he at length fixed on the common locust. He tried for seven years to propagate this tree, and at length adopted a method by which he could make himself as sure of a plant from every seed, as from Indian corn:" but what this method was he does not mention. My own first experiment was by sowing the seed in May, which produced plants from two to four feet high the first year, although the soil was poor. My other trial was two years ago; sowing the seed partly on the 10th and partly between the

10th and 20th of May. The seed sown immediately before a refreshing rain, came up well; while that sown two days after, followed by dry weather, generally failed. Like the apple tree, the locust, while young, is subject to be eaten by the field mice.

The locust seed is easy to collect in the pods. It is in shape and taste like a bean. The time of sowing must be directed by the climate, to be secure against frosts. Whenever, in the spring, it will be safe to plant the common beans of our country, the locust seed may be sown with assurance of success. It should be sown in rows far enough apart to admit the hoe in cultivating the plants in the seed beds.

I am, dear sir, very truly yours.

TIMOTHY PICKERING.

Mr. Kirk has recently communicated his method of raising locust trees from seed;—it is as follows:

"The method is to immerse the seed in water, hot enough to scald a hog; to let them remain in the water till it cools, then to sow them in drills, eighteen inches or two feet apart, that they may be the more readily kept clear from weeds, as the plant is very tender when young, and will be entirely lost if the weeds are suffered to grow up with them.—They should be sown in the spring, in common gardening time, and they will grow very soon, and if kept clean in the fore part of summer, they will be out of danger.—If they are not too thick in the rows, they will stand so till they are two years old, when they will be fit to plant out."

J. MEASE.

Account of a Corn Shelling Machine, by Charles W. Peale.

Read September 15, 1813.

Belfield, Philad. Co. Aug. 27, 1813.

Dear Sir,

The enclosed sketch and explanation will I hope give a perfect idea of the corn shelling machine; a description of my mill and the various application of it to husbandry in the saving of labour, I must reserve for some future day, when I may be able to make the various machines more complete, by extending the building.

I am, dear sir, with high consideration,
Your friend,
C. W. PEALE.

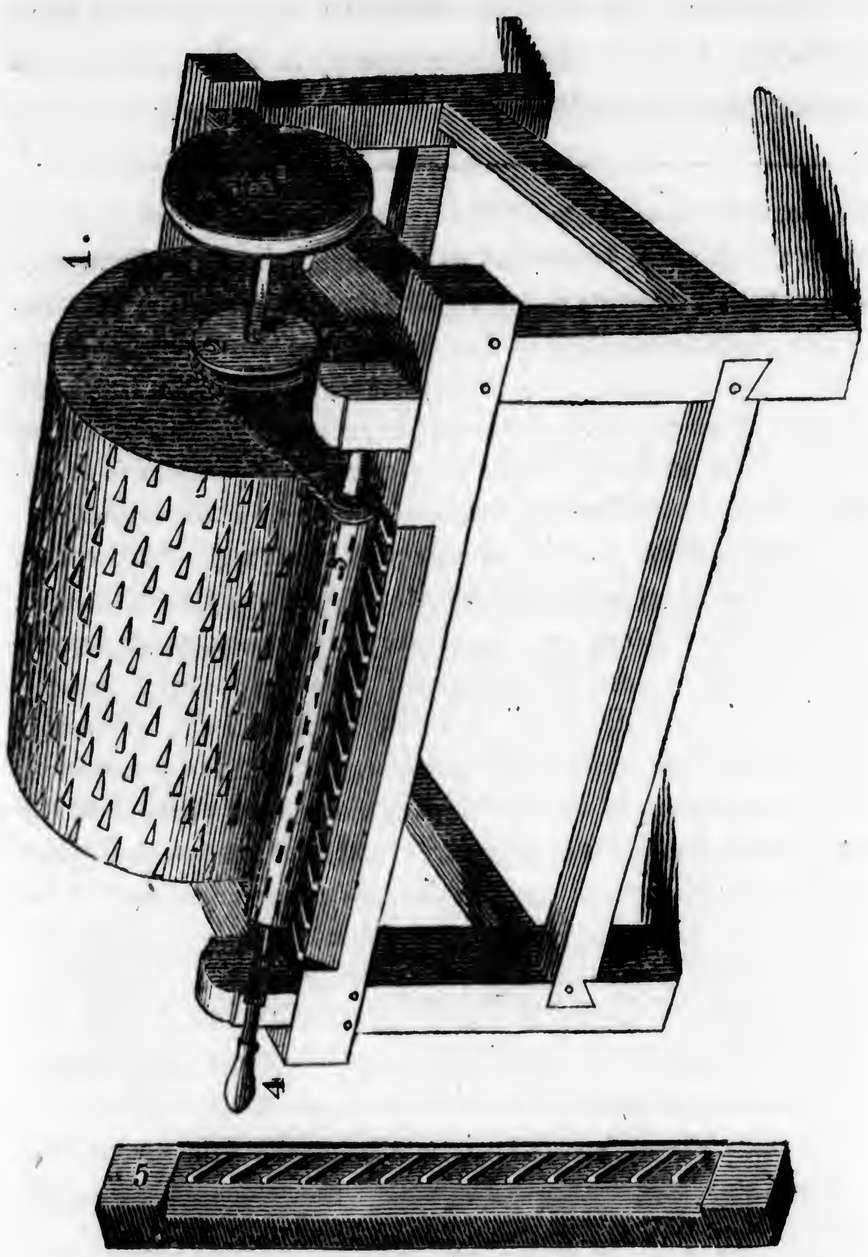
P. S. By some experiments I find that butter is best made by churning very fast, but great care is necessary to stop the mill the instant the butter begins to *gather;* then the movement must be very slow to gather the butter, otherwise it will be very soft, and the butter milk will be so much beat into it, as to render the separating of it extremely difficult.*

* Every chymist knows, that BUTTER is the oxigenated oil of the milk. The more rapidly and completely this oil is separated (its mixture being mechanical or very slightly chymical) so as to expose the most particles to the oxigen of the air; the shorter is the time, for what is vulgarly called, "the coming of the butter." I am procuring to be made, a *churn*, with a staff, to which is attached, on a pivot at the lower end, an horizontally and rapidly turning *dasher*, with four arms or vanes, like those operated on by wind. In the up and down strokes, the dasher moves in contrary directions. This is said, in an agricultural work, from which I took the drawing, to be the easiest and most expeditious mode of churning the butter, by exposing the greatest number of particles to oxigenation, in the shortest time. I shall give to it a fair experiment.

In some parts of *Europe*, the new milk is churned. But I should presume our usual mode is preferable. By the standing of the milk in the pans, the cream (which contains the oil) rises, and is separated. The albuminous, gelatinous, and watery parts begin to separate in the cream pot, if left to stand a reasonable time; and acidulation (not acetous) forwards the process. Oxigenation commences before the agitation in the churn takes place; and a portion of the work is anticipated. In the severe weather of winter, difficulties sometimes occur in churning. In addition to immersing part of the churn in hot water, one or two spoonfuls of sharp *vinegar*, mixed with the cream in the churn, are very efficacious. The separation of the oil is thus promoted; without, in the least, affecting the butter. The vinegar, as do all acids and spirituous liquors, combines with the *whey;*—alkalies and rennet enter the *curds*.

Soap, mischievously slipt into a churn, prevents the cream ever making butter. *Alkalies* are as destructive, as acetous acids are salutary. See *Bath* Society Memoirs, 3d vol. 2d ed. 309. 1788. Where, probably, I picked up the information respecting *vinegar*. The writer used distilled *vinegar;* but any good vinegar will answer. The quantity is arbitrary; and if too little be used at first, it must be increased. He recommends a table spoon full to a gallon; after the cream has been considerably agitated. I have not been nice, either as to quantity or time. R. PETERS.

The name of the inventor of the corn shelling machine, I have just understood, is John Haven, of Montgomery county.



Description of the Corn sheller.

No. 1, is a white oak log, 22 inches long, and turned to 20 inches diameter, in which are triangular pieces of iron, giving a length of one inch, and drove in at an equal height of 1-4 inch, in an oblique position, as indicated by the drawing. The pulley, No. 2, is six inch-

es diameter, carrying an elastic band to a pulley of 3 inches diameter, which turns the roller, No. 3, of 2 1-2 inches diameter. This roller also has iron pins of about 1-2 inch on the surface, in like oblique position as the large roller. The handle, No. 4, moves in a groove, with the pivot of the small roller passing through it, in order to bring the said roller forward to receive the maize to be shelled.

No. 5, is a view of the frame underneath the small roller, to show the iron wedges, drove in an oblique position ; about an angle of 45 degrees, and on the side next the large roller is an iron plate, placed at the same height of the wedges, i. e. 1-2 inch.

The large pulley is made to receive its motion from a drum in a mill, but a small crank may be put in place of it, and then be moved by a treadle.

One bushel of corn in the ears, may with ease be shelled in five minutes.

Rotations and Changes of Crops defended, by Richard Peters, Esquire.

Read November 9, 1813.

Belmont, October 17, 1813.

Dear Sir,

I send, for communication to the society, a letter from *D. Cassat*, Esqr. of York Borough, in this state, and its enclosure; handed to me by Captain *Anthony Robinson*, to whom it was directed. There can be no doubt of the truth of any facts, avowed, or countenanced, by one so respectable as Mr. *Cassat*. Nor is there any occasion for my disbelief of such facts; which are similar to many I have met with. I have, however, observed, that almost all the like facts, have arisen in the way in which Mr. *Eckert's* have been established.—They have occurred in the cases of owners of small spots, whom necessity had compelled (on a calculation that it was the most valuable product) to sow *wheat*, in constant succession. I have known the same practice succeed, for a considerable length of time, (most frequently fail) with Indian corn, and other grains. But the great balance of such farming, on any extensive scale, has been unsuccessful and injurious. That *wheat* would, in some anomalous instances, grow well on the same spot, with repetitions of manure, for several successive years, I never denied; though, as a general practice, I have always reprobated it. *When* the *pabulum* for this, or any other grain, will be exhausted in the soil of any particular spot; or how long renewals of manure, will linger on, its capability to produce the same species of plant; depends so much on circumstances beyond our ken, that no determinate judgment, by anticipation, can be formed. But, that its exhaustion, and the deterioration of the crop, will finally happen, we have the experience of the most intelligent men, from the dawn of agricultural information to this day, to warrant our belief. It is not an abstract and speculative opinion; but a conclusion from long known practical experience. Many individual animals, the human race included, will begin earlier, and longer continue, a state of fecundity, than the common mass. But it would not be a sound conclusion to say, that, *generally*, animals are alike, in this regard.

I consider such anomalous instances as the one I present to the society, to be, (as they respect the general subject,) unfortunate occurrences. They claim from us our assent; and should have every fair opportunity afforded for their publicity. Yet they tend to foster and confirm bad practices; and to root out, so far as they are influential, all attention to, or reliance on, system and principle.

I continue to be convinced, that, however it may be in particular instances, the general prosperity of our agriculture, and that of every well cultivated country, most essentially depends on adherence to the well established system, of a rotation and change of crops. It would be endless to cite the numberless authorities, from the best writers, both elementary and practical, in proof of this position. It would be still more irksome and unpleasant, to repeat what I have heretofore said on this subject.

Mr. *Cassat* adds his own experience; no doubt also on a small spot. If practical farmers (who read little on such subjects) should ever see this communication, it will be happy if they should be forcibly struck with Mr. C.'s suggestions of the probability, that this *intailed or settled perpetuity*, (which is generally as injurious in farming, as he knows such to be odious in law,) "depends upon the quantity of land a farmer will be able to manure." If this practice should induce those who have a passion for it, to increase their stores of manure, some good will come out of evil. If, on account of deficiency of manure, the better practice be followed, from convenience and necessity, it will be salutary in result; though not so meritorious, as when it flows from both convenience and principle. But what can be said in favour of it, where, in our new countries, the most fertile lands, requiring no manure, are filled with *sorrel*,* and other pests, by the practice of stubbling in, and sowing one culmiferous crop after another; till the land will bear no more such? The soil remains rich enough; and will bear (with better ploughing and management,) any other crop, than one of the species of that, whereof it had been (in the country phrase) *sickened*. A deficiency of animal and vege-

* Where *lime* is easily procured, if the land overran by *sorrel*, were dressed plentifully with the lime; the capacity to bear *wheat*, or any other crop, would be restored. *See our list of premiums, Vol.* I. *page* xliv. *To this, Lord* DUNDONALD'S *authority may be added.* The efficacy of the *sorreline acid* on vegetation, is well known. This acid is produced by the application of *lime*; which decomposes and banishes the *sorrel*. R. P.

table manure, has not always occurred. For, (although time has brought forward wiser convictions,) it has not been singular, in our new countries, to remove barns and stables, from sites deemed to be *incumbered* by dung-heaps!

Of constant and long successions of *Indian corn* crops, in sundry places, and particularly on rich bottoms; especially on those subject to overflows, which bring along with them, and deposit, accessions of new soil; I have heard accounts, the most favourable to the idea of perpetuating the same species of crop. Probably the culture of this plant, never occupying exactly the same place in the hills of succeeding years, keeps down weeds, in greater or less degrees, and enables it to thrive the longer, like grain sown according to *Tull's* drill husbandry, on the same field.—Peculiarly on rich bottoms; which are commonly abundantly fertile. These may furnish more of the *specific pabulum*, than soils of common texture afford; if there be any well founded evidence of this doctrine; for I vouch theories with hesitation.—But I have no more idea of thus establishing a general principle, or shaking one well fixed; than I have of determining the duration of human life, by the longevity, or strength of constitution, of some men: much less would I adopt as a rule, the instances of some, who live long, under the practice of inveterately bad habits. General results, and common calculations, are not impugned by such examples.

It is safer and better, to follow methods generally approved; than to suffer ourselves to be carried away from them; because, in some instances, contrary prac-

tices succeed for a time, or under particular circumstances. Wandering from settled habits, known by experience to be salutary, will create confusion and uncertainty; and baffle every past and future endeavour, to reduce the art of husbandry, to any unquestionable system, or fixed principles.

I do not feel the less obliged to Mr. *Cassat*, for the laudable pains he has taken to furnish information; whatever I may think on the subject of it. It was a leading motive with us, in the establishment of our society, that facts, on all sides of agricultural questions, should be collected and promulgated; to enable every farmer to judge for himself; according to the circumstances in which he is placed. The mere point of deterioration of grain, is not the sole question. The advantages of rotations, and changes of crops, or what is called convertible husbandry, reach far beyond any consideration, in which that point is involved.

Your very obedient servant,

RICHARD PETERS.

DR. JAMES MEASE.

Secretary of the Philad. Agric. Soc.

WHEAT *on the same spot for several successive years.*

Read November 9, 1813.

Sir,

I enclose you the certificate of Peter Eckert, on the subject of raising wheat several years in succession, on the same ground. From my knowledge of Peter Eckert, I have reason to believe that what he states is strictly true.—I got him to state his manner of tillage and manuring, and I have no doubt from what I have observed in my own experiments, that wheat may be annually raised on the same ground for many years, but whether it would be more profitable than a rotation of crops, will depend upon the quantity of land a farmer will be able to manure.*

I am, with respect, yours, &c.

D. CASSAT.

CAPT. ANTHONY ROBINSON.

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*Those who conceive, that grain can be perpetually raised on the same field, without manure, by any changes, either of the species, or locality of drills; are certainly less justifiable, than the perpetualists who manure their grounds. I think that both would find themselves mistaken, on a scale of any considerable extent. No prudent advocate for changes, or rotations, would recommend constant successions of tillage-crops; under any circumstances of change. GRASSES fill the intervals, required in good husbandry, between the crops calling for the plough. The period of *rest*, is thus beneficially employed. Rest and manure are as essential to worn lands, as changes of crops; and neither are efficient, without the others. Changes of crops prolong the fertility of new lands; which, by the bad farming usually practiced, are hurried into poverty, in a period lamentably short. Although in the drill-husbandry, more may be done, (as the *Tullians* assert) than in broadcast, *without rest and manure*; yet I must be excused for my incredulity; when I doubt the durably beneficial results of either mode.

Certificate.

I live in Hanover, in York County, and have a lot adjoining the town lots, containing one acre, and one hundred and fifty three perches, enclosed with a fence standing on the line, by which I am prevented from ploughing about two feet of the lot all round it, which takes off nine perches, and reduces the whole of the lot under the plough to one acre and one hundred and forty four perches.

Six years ago it was in grass, and poor. I ploughed up the sod, put on some stable manure, and then sowed three bushels of wheat on it.—The crop was very heavy, but I did not measure the grain. I then stubbled it down, harrowed it, and sowed three bushels of the wheat which I had just taken off. The second year's crop was full as good as the first. When I took off the second crop, I ploughed down the stubble again, and sowed wheat of the crop of the preceding year.—In the winter I put on a thin coat of dung—the third year the crop was quite equal to any of the preceding years—I ploughed down the stubble, and sowed orange-straw-wheat, (the three first years was red-chaff.) The fourth crop was overgrown in the straw, and therefore did not yield so well as the former years. That crop, however, I had measured, and it yielded 83 1-2 bushels, weighing 62 1-2 pounds per bushel. The former crops

A surface clothed with a cover of grass; clover particularly, is always meliorated. Constant stirring forbids grazing. Even where the hoof and tooth are excluded from clover; sown to rot, and supply vegetable pabulum; great benefits arise to those who farm only for crops requiring the plough or hoe. The interval of rest affords manure; where none other can be obtained. R. P.

were all better than the last mentioned. I then ploughed down the stubble, and sowed wheat the fifth year in succession, and put a coat of manure on it in the winter. The crop was reaped this summer, and when threshed will yield as much as any of the preceding crops, if not more. The wheat this year was very strong and well filled. I intend to sow the ground with wheat this year again.—I verily believe, that the crop of the fourth year, which measured 83 1-2 bushels, was the lightest of the five.

A number of the most respectable inhabitants of Hanover, are well acquainted with most of the facts here stated, as the lot has been frequently examined, and the crops which I have raised on it have excited the attention of the neighbourhood. Every crop was clean, and fit for seed wheat.

I have made this statement at the request of D. Cassat, this 10th day of August, 1813.

I intend to put wheat in this lot, every year, for a long time to come, as the land seems to improve under it. Several of my neighbours have began the same plan, and have had wheat on the same ground three years in succession, and it succeeds as well with them as it does with me.

PETER ECKERT.

Witness. D. CASSAT.

On Fiorin, Mangel-Wurtzel, Onions, and Cabbages, by Richard Peters, Esquire.

Read, November 9, 1813.

Belmont, October 7, 1813.

Dear Sir,

On the 4th instant I cut my FIORIN. I found, that practice, to a large extent, will be required, before our people will become adroit in cutting this grass. My little crop was matted and much entangled; and the smooth edged hook was employed in preference to the sithe; with which latter, little could be done. In *Ireland*, the sithe is always used.

I caused the produce of a small patch, measuring nearly two square perches, to be weighed, as soon as cut. It weighed 306 pounds. I calculate this to be at the rate of near ELEVEN TONS, to the acre, (statute) of *green* fodder. When dried, it weighed 120 nett pounds; or at the rate of only four tons, one quarter of a ton and eighty pounds. What older grass, or that on wet soils, or those flooded or irrigated, will do; further experiments must determine. Though perfectly free from any disagreeable smell; it has not the inviting savour of our good hay.

I think it should have been cut sooner; as many of the strings appeared dry, and not flourishing at the root; though in general sound and succulent.

I presume that, in *Ireland*, the twenty tons of green fodder, in a season, to the acre, mentioned, by Dr. *Richardson*, as having been made by Mr. *Curwen*, must have been calculated on more cuttings, or older and

more luxuriant grass, than any we can yet expect. Perhaps the acre meant, is the *Irish* acre;—more than one half larger than ours. The strings of my grass are, certainly, much inferior, both in size and succulency, to the *best* of the imported *Irish Fiorin*.

My horses ate the green *Fiorin* greedily; though there is, in some parts, a small tang of mustiness. My cows do not relish it, now; whatever they may do in winter, when I shall try them with that cured for keeping.

I send some strings; which will serve as a specimen of the crop;—tolerably promising for the first year; and considering my having yet every thing to learn, as to its culture; and that my ground is dry. Many strings measure five and six feet in length. I have furnished every means I possess, in the present stage of the experiment, to enable the society to form its opinion.

I have frequently chewed the strings. They afford a remarkable sweetness, or saccharine taste;—far beyond other grass. In *Evans & Ruffy's Farmer's Journal*, LONDON. May 3d, 1813, there is the following paragraph; which they give from an *Edinburgh* paper; —without vouching for the truth of it.—This weekly journal, is a valuable collection of agricultural information; of unimpeached credit, and well supported.

"FIORIN GRASS. A chemist, whose accuracy may "be depended on, has lately submitted this celebrated "herb to analysis; and found, as might have been ex- "pected, that it contained a very unusual quantity of "saccharine matter, not unlike treacle in colour; and "having very much the taste of a mixture of that sub-

" stance with currant jelly. A trial was then made, to " ascertain the quantity of *spirit*, that could be obtain- " ed from the same material; when, on the first at- " tempt, (from forty pounds of *Fiorin hay*,) *seven pints* " of very palatable *spirit* was distilled; much superior " to common WHISKEY; and far better than the pro- " duce of any other kinds of grasses; beside being " more abundant."—Whether this be a satire on the Fiorinists, or a serious fact; it is not difficult, experimentally, to determine.

I send also some culms with panicles; and seed. The former slightly resemble the panicles of blue grass; and the latter, the seed of herd grass; though smaller. It is more for curiosity than real use; for it is agreed, that propagating from the joints of the strings, is the only eligible mode. I have some now for distribution, to experimenters. Any one may see, how widely different the *Fiorin* is, from the *squitch* or *knot grass*, *(triticum repens,)* with which it has been confounded.

MANGEL-WURTZEL.

I weighed the first stripping of the leaves. The patch in which they grew, contains about a sixteenth of an acre. The weight of the whole was 680 nett pounds. I have stripped them three times; and am proceeding in the fourth. Three strippings, at 4, 1-4 tons each, is 12, 3-4 tons, per acre. But the quantity is unequal, in the several strippings; yet I think I may safely calculate, for the season, on FIFTEEN TONS, to the acre:—allowing two tons, as deduction from 17

tons; which would be the amount of the total, if all were equal.

My cows are so fond of the leaves, that, with them and common pasturage, they have been kept (generally) flush, through the season. My dairy-maid informs me, that it makes an odds of one and an half, and frequently two pounds of butter to each cow, per week; when they are fed, or not, on scarcity leaves. I offered them the green *Fiorin;* but they rejected it. The scarcity leaves were immediately thereafter thrown to them; which they ravenously devoured; though they had been, through the day, in excellent pasture. My horses are not now inclined to eat the leaves; though, in the last winter, they ate the roots with avidity.

These quantities of green fodder are highly encouraging; and can be obtained, easily, in our climate. Dr. BROWN's account of GUINEA GRASS, for a more southern latitude, exceeds all products our climate admits. We must be content with the best we can obtain; without regretfully comparing ours, with the advantages reaped, in other regions, from a grass which may not succeed here; though well worth the trial. The *Mangel-wurtzel* has, however, the advantage of affording constant supplies of green forage; when other such are scarce. Add *the roots*, which exceed the weight of the leaves; and no plant seems more valuable.

I have had a much greater weight of leaves, in former times: and *European* accounts far exceed any I have experienced. Double my present product of both leaves and roots, has been known. Mine, this season, were planted for cleansing a piece of ground, which

required such a crop; and were not set thick. Half as many more (possibly double, in broad-cast) could have been planted, in the same ground. I do not think this season has been favourable, either for leaves or roots: They have, however, yet, time to increase.

ONIONS.

I have been in the habit, for the past three years, of raising *onions*, agreeably to the method mentioned by our member *William Phillips*, Esq.; page 18, of our 2d vol. I sowed the seed in September, or the latter part of August. They have uniformly been so far superior, in weight, quality, and facility of culture, that, did I not know the inflexibility of old prejudices, I should wonder at any other mode being persisted in. My old gardener is inveterately prejudiced, in favour of his accustomed culture by plant-onions. He strives to exceed those sown, in the way first mentioned; and will even neglect them, while he pays every attention to his favourites. Yet he has never been able to equal what he calls my "new fashion;" in any respect. I have weighed them against picked onions, in his old mode of culture; and mine sometimes exceed as two to three; and always weigh the heaviest. I think those sown in the autumn, should be gathered a week or fortnight sooner than the others. If they are left on the ground too long, they are apt to split, or grow double. —Earthing over a few rows, makes them much more mild and palatable, for early use; than those left to bulb entirely above ground.

CABBAGES.

I have, during a great part of my life, practiced sowing cabbage seed (a particular species of *Savoy* is the best, though many kinds will answer;) about harvest time; and planting them out in September, or the beginning of October, in drills. Some perish, and on this account they must be thickly planted; but more than sufficient stand the winters, without cover, uninjured. They are fit for the table quite as soon, and often sooner, than those where the plants are raised in hot beds. The drills must be on ridges, elevated so as to prevent water lying on the plants, in winter. I forget who suggested to me this method; but I think it was the late Dr. *Witherspoon*, who was intelligent in horticulture, among his other valuable acquirements. It is a practice well known in several parts of Europe, where the winters are quite as severe as are ours.

I have practiced this method (excepting a few instances, for experiment) only in my garden. But I am satisfied that *field* crops may be raised in the same way.

Your obedient servant,

RICHARD PETERS.

DR. JAMES MEASE.
Secretary of the Philad. Agric. Soc.

On American Gypsum.

Read November 9, 1813.

Belmont, October 30, 1813.

Dear Sir,

This day only, I received the enclosed letter; for which I am much obliged to *Philip Church, Esq.* of the state of New York. Before I was informed of the letter of Mr. *Cist*, inserted in this volume, I took pains to gain information on the subject of it; and wrote to Mr. *Church*, for the purpose. Although the letter of the former would have been sufficiently satisfactory; yet Mr. *Church's* account is not only corroboratory, but it adds circumstances well worthy of notice. The inexhaustible quantities, and accessibility, of this all-essential material,—the PLASTER;—found in our own national territory;—not liable to obstruction in its transportation, by disturbances on the ocean;—and withal so perfectly convenient to our own state;—must be a source of singular satisfaction. More especially to those (myself particularly) who recollect the small, and, for a long time, unpromising beginnings, of this now great and widely extended improvement to our husbandry.—Not longer ago than the time of publication of our first volume, in 1808; the subject of its existing, in any great quantities, within our territory, and its description, or quality, was involved in doubt and obscurity. Now, a full development is made; and the facts are actually tested, by the irrefragable evidence, of experience, on a large scale. To a

Pennsylvanian, the information must be doubly gratifying. In this state, on its eastern border, the efficacy of the PLASTER was first proved, and promulgated. Now, endless supplies, within reach of our northern boundary, are to be obtained; and safely brought to us, even under present circumstances, at no formidable expense;* and in quantities amply sufficient not only for our own; but other states. To facilitate the transportation even of this article, the canals and roads necessary to communicate with the quarries; would be highly desirable and lucrative. But when, in addition, the other countless benefits we should derive from them, are considered; no doubt can remain, of this being one of the greatest objects, to which the public attention can be applied. Warning, as well as encouraging, examples of attracting internal trade; and its materials for external commerce; are held up to us by a sister state. She spares no pains, and neglects no opportunities, to take every advantage which

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* Although we, in this quarter of the state, may pay high for *plaster* from the *lakes;* yet our case is only reversed. We change circumstances, with those who were heretofore supplied from the sea board. But when the war ceases, and plaster is again brought by sea; we shall derive a solid advantage, indirectly, by the supplies afforded from the lakes, to the country accustomed to deal with us. All their demand for the article here, will be at an end; and we shall obtain it the cheaper; because there will be fewer purchasers in the market.

No impediments to our trade for this article, out of our territory, can now be apprehended. Such impediments will be perceived to be idle: it being ascertained, that we now have our supplies, within our own power. R. P.

either nature or capital affords.—In peace, the facilities of roads and canals are evident;—in war,—we now perceive their indispensable use; and feel the privation.

I am your obedient servant,

RICHARD PETERS.

DR. JAMES MEASE.

Secretary of the Philad. Agric. Soc.

Belvidere, October 8, 1813.

Dear Sir,

I had not the pleasure of receiving your letter until the latter end of July; since then I have been trying to procure the information necessary to enable me to answer the enquiries you have made respecting the locality and quality of the gypsum, lately discovered on our lakes.

The greatest bed of plaster yet discovered, is upon the eastern bank of Cayuga lake, extending the distance of thirteen miles, from the salt springs, at Montezuma, up the lake, to Union spring, (see enclosed map) the whole of the distance between these two places, abounds so much with plaster, that it is found wherever the trouble of digging for it is taken. Another considerable quarry has been opened at the termination of the rapids of the outlet of Seneca lake. (see A) By far the greater part, if not all, of the plaster sent to your state, is taken from these two quarries, and it is supposed that they will produce plaster enough to supply the demand of your state for ages to come.

There are also various beds of plaster, lying in different directions, from ten to twenty miles, north, north-west, and north-east of Geneva.

As to its quality, several farmers, upon whose word and judgment I can rely, and who have also tried the Nova Scotia plaster, at their former places of residence, assure me, that if there is any difference, ours is the stronger and more efficacious. When, however, a quarry is first opened, the plaster found near the surface is of an inferior quality. The New England people, living near the quarries, have tested the fertilizing effects of the gypsum, by strewing it upon their wheat and grass lands, so as to represent their own names, and various characters and figures. The luxuriance of the wheat and grass show where the gypsum has been sown. They now make great use of it; and many farmers from Tioga and Steuben counties, this year, as well as last, have gone a distance of thirty and forty miles, to procure it as a manure for their land, which is mostly a dry, gravelly soil. In consequence of the discovery of plaster, this land has risen very much in value. The gypsum is carried by water, either to the head of Cayuga lake; thence by land twenty eight miles to Owego: (the head of Seneca lake;) thence by land, eighteen miles, to Newtown; from Owego and Newtown, down the Susquehannah to different parts of your state. The plaster transported by the way of Seneca Lake and Newtown, is obliged to be carried round the falls of the Seneca outlet; a distance of about two miles. A canal will be cut round these falls next summer; in which case, the probability is, that much of the plaster will be transported to your

state, by the way of Seneca lake and Newtown. Should our northern, ever be connected with your southern waters, by means of a canal, from the head of Seneca lake, to the Susquehannah, at Newtown, not only plaster will be transported that way, but a great quantity of salt, as well as all the produce of a very great portion of the Genesee country. So that the discovery of plaster on our lakes, will be the means, not only of enriching the lands of Pennsylvania, but also of promoting improvements, which will turn the produce of the most fertile and best cultivated portion of the western part of New York state, from Canada, to Pennsylvania.—On the subject of a canal, from the head of Seneca lake to the Susquehannah, I refer you to two letters, page 119, published in a pamphlet entitled, "Letters addressed to the people of Pennsylvania, respecting the internal improvement of the commonwealth, by means of roads and canals," by W. J. Duane.*

Respectfully and truly yours,

PHILIP CHURCH.

HON. RICHARD PETERS.

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* INTERNAL IMPROVEMENT; *by Roads, and Water Transportation.*

These all important auxiliaries to the business and prosperity of our country, do not depend, for their permanent usefulness, on circumstances, to which transportation on the ocean is subject. They are under our own command; while the navigation of the ocean is under the control of the most powerful at sea. The demand for them is often the greatest, when external commerce is interrupted. Our foreign trade, so far as it depends on our own ships, is now nearly annihilated, by the ambition, jealousies, and injustice, of two great nations, who, through ages, have been in conflict for predominance. With the view to each other's annoyance, we have been, for a long course of time, subjected to the violences of both. One claimed the right of visiting our ships, at its pleasure. If they escaped the fangs of the visitants; the other burnt them, for being thus visited. *We* were driven from the ocean; and resorted first to ineffectual expedients, for repelling aggressions; and finally are involved in all the vicissitudes and dangers of war. Under this predicament, our active and enterprizing character, prompts to the employment of capital and labour, in other objects than external commerce; *Manufactures* are now the prevalent passion; and *agriculture* seems to be regarded as only important, according as it is subservient to them. Yet AGRICULTURE and COMMERCE are the great and leading interests of our country. They will so remain: although we are now thrown into an attitude, requiring our attention and exertions to the supply, among ourselves, of the fabricks we have been accustomed to receive from abroad; in return for the exports of our products.

The PLOUGH, and the SAIL, are the appropriate *emblems;* and "*laissez nous faire*"* the motto, of an agricultural and maritime nation. The less the governments of such nations interfere with those leading interests, AGRICULTURE and COMMERCE; (except to foster, promote, and protect them,) the better they flourish. And they must flourish, or fall, together; their interests being inseparably connected. *Manufactures*, to a certain degree, may be, at all times, and are especially in *our* present situation, necessary, and highly desirable. They should always, however, be secondary to the more general interest,—AGRICULTURE:—with and to which, if not extended too far, they are compatible, and auxiliary. Whensoever they are predominant, the situation is temporary, and unnatural. But suppose, that we were to state an extreme case, not likely to happen; and say, that,—to accommodate our agriculture, and facilities of water powers, to the present state of things;—the greater part of our farms were converted into sheep walks; and, (reserving the fewest possible for grinding our bread-stuffs,) almost

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* "*Let us manage our own business.*"

every stream were devoted to spinning jennies, and other machines for turning spindles; and moving tilt-hammers, rollers, and other machinery for works in metals. Still we should require agricultural operations, and the necessary conveyance of their products, for our own, and the support of the manufacturers;—too much immured,—and, most frequently, too dissipated,—to cultivate the ground; —even for their own sustenance. If the great body of our domestic animals, were metamorphosed; and changed into sheep;—the PLASTER will yet be the grand requisite for enriching their pastures: and land and water transportation will be constantly required for its conveyance; as well as that of the materials for manufactures, and the fabricks produced by them. I have heretofore mentioned, the great distances, in *England*, from whence heavy and bulky materials are conveyed, by canals, to the manufactories; placed where they are, merely on account of the pit-coal, used as fuel. Interior land and water transportation, by artificial roads, and canals, (the latter the cheapest and best) will be always in requisition. In peace, it is all essential;—in war,—not less so. Even in our late anomalous situation,—when neither at peace nor at war,—we should have found its inestimable use.

I am under obligations to Mr. *Church*, not only for the information he gives; but for the reference he makes to the pamphlet published by Mr. *W. J. Duane:* which, it is possible, I should not have seen, but for this reference; however highly worthy it may be, (and certainly is,) of the serious attention, of every well wisher to the prosperity of *Pennsylvania*. Although I may not agree in *all* Mr. D.'s sentiments collateral to his main object; yet I think his assiduity, and judgment in collecting facts; and his patriotic, animated, and sensible observations on, and elucidations of them; entitle him to the thanks of his fellow citizens.—Mine he has, sincerely. Mr. D.'s mortifying embarrassments, in his endeavours to prevail on the great body of a legislature, to see the plainest truths, through the film of prejudice;—I can well conceive. I had a *quant. suff.* of these, to encounter; in my legislative career. I believe the bill, for establishing the first appropriation for roads and internal navigation, passed 23 or 24 years ago, was drawn by myself; to effectuate the measures proposed by an association of some of the most respectable citizens of that day. Sure I am, that I took unwearied pains, to forward the objects of it. Heavily enough, did it drag through the house; and sufficiently maimed and curtailed (particularly as to the sum proposed to be appropriated) was it, in its passage. Yet it has served as a nest egg; to use a trite phrase; and a brood has sprang from it, which, so far as it has been spread, has been highly beneficial to our state. Abuses, mistakes, and mismanagements, in public operations; and in private enterprizes not before attempted; are no curiosities. It is to be earnestly hoped, that the efforts of the friends to public improvements, will still be exerted; and,—though the fruits be slow in maturating,—they will finally be sure and nutritious. If, as Mr. D. truly laments; *the people* do not send representatives sufficiently clear sighted; *it may be*, that the people are not a little blind themselves. And, in such case, they are truly and appropriately, though very unfortunately, represented. If such pamphlets, a little condensed, could be generally dispersed; and, what is more difficult;—and would be miraculous;—should they be read, and fairly and candidly considered;—a great and profitable result,—felt in all quarters of our state,—would undoubtedly follow. I think it would be of public benefit, to impress and disperse the sentiments and facts, expressed and collected by Mr. Duane, in this pamphlet; which gave rise to the foregoing remarks. For this purpose, I would take the liberty to recommend the insertion of letters xii and xiii, (the immediate subjects of Mr. *Church's* reference,) among our collections, in the appendix to this volume. But it should be mentioned, as due to the character and honour of our state, that, since the publication of the letters contained in this pamphlet, great advances have been made towards the accomplishment of its objects; though much remains to be done.

I am far from wishing to depress, (if I could) the present laudable spirit, for establishing and promoting manufactures; which the existing circumstances of our country invite and require. But I think the increase of an independent agricultural population, is a far greater security to the freedom and happiness of our country;

than is the employment of our surplus labour, (the true balance of wealth, in all countries,) in too extensive manufacturing establishments. Multiplying the facilities of intercourse, by interior improvements of roads and navigation; tends, in the most eminent degree, to increase settlements of our waste lands; and thereby to multiply also the numbers of our best people. Increasing the numbers of *such men*, is giving real strength, and permanent freedom, to the state. I wish to every enterprizing citizen, either in commerce or manufactures, the wealth he is entitled to. Yet I believe, with an old author, that, to save a country from external attacks, or internal commotions, "a wall of men, (such as agriculturists generally are) is far better than bags of money." And I think, with *Berkley*, that "a numerous stock of people," (such as agricultural people are most likely to be) "*well fed, clothed, and lodged*, will constitute a flourishing nation."

The improvements of our roads, and transportation by canals and rivers, should, most assuredly, be the primary objects of both public and private exertions. *Our* country, holds in contemptuous defiance, the visions and sophistry of *Malthus;* and those of his school; —and will so continue to do, for ages yet to come. There cannot, here, be an excess of population; beyond the means of subsistence. *Lands* will constantly afford an exhaustless source of employment. *Commerce*, when revived, will open boundless channels for labour and capital. *Manufactures* furnish another fund, for industry to draw on. True, the latter have arisen, chiefly, from *commercial* restrictions, during *peace;* and are now extended to *war* speculations: inviting, or compelling, a wish for its continuance; and thus exhibiting one of the evils of an hostile position. They are, on this account, subject to great uncertainty, both in their profits and duration. Yet even in this, they share with other pursuits; and the "*laissez nous faire*," must still be the motto. They will (like trade) regulate themselves; and find their true level. Uncalculating ardour in pursuit of wealth, and not want of means; is the sin, that "too easily besets" too many of our countrymen. Whatever may be the changes to which circumstances may expose our manufactures; a seed of a gigantic plant is sown; which time will increase. Prudence, warned by partial misfortune, may change its habits; and lop its exuberances. But no alteration of circumstances will ruinously blast, or eradicate it. Whatever may be the state, either positive or relative, in which *agriculture* and *manufactures* may be found, at the cessation of hostilities; and the consequent, and most desirable, return of *commerce;* ROADS and INTERIOR NAVIGATION, will ever be mainly the auxiliaries to their prosperity; and the hand-maids, constantly ministering to their advancement and success.

R. PETERS.

On Jerusalem, or Syrian Wheat. Big Rye; properly called, Tangier-Wheat.

Read December 14, 1813.

Belmont, October 26, 1813.

Dear Sir,

In our present volume, page 19, & seq. I gave an account of the *Syrian*, or *Egyptian Wheat*, and the *Big Rye;* as circumstances then warranted. Both the wheat and the rye, are now widely dispersed; and will be valuable additions to our grains, in some quarters of our country. In my neighbourhood, nor with myself, neither the wheat, nor the rye, have thriven so as to encourage extensive culture. In a more southern latitude, I am certain, both will do well. I have had, sent to me from the *Delaware state*, a sample of excellent flour of the rye, as we call it; and I never ate better bread, than that made of it.

By an error in the press, or in the copy, the *wheat* is stated to be of "*African*," whereas it should have been said to be of *Asiatic*, origin.

Had the origin of the *rye* been thus designated, it seems now, that it would have been correct. For I have received, by the cartel *Robert Burns*, a letter dated the 14th of August last, from my highly esteemed friend, *Robert Barclay*, Esq. of *England*, to whom I had sent some samples of the rye, as we have improperly termed it, in which he gives me the following account of that grain.

"The grain you sent me in 1811, as new *French* "*rye*, I have growing freely on my ground; and proves "TANGIER WHEAT; as it was deemed, the last spring, "by *Sir John Sinclair*, and others of the Board of "Agriculture. The same kind was brought to me by "a gentleman from the *Mediterranean*, this spring."*

So that we now know, exactly, what it is;—and the climate in which it prospers. We can, therefore, accommodate our culture accordingly. Our extensive national territory, in one or the other of its parts, partakes in the advantages of all climates. I have long suspected, that this grain would be, finally, discovered to be one most suitable to a temperate region. Wheat may, nevertheless, be indigenated in any country; it being the grain of all climates.

MANGEL-WURTZEL.

On the subject of this root, I had corresponded with Mr. *Barclay;* and had sent to him a copy of my communication, which appears in this volume. He writes, in the letter before cited, as follows.—

"My experiment of the *Mangel-Wurtzel*, goes on "prosperously; and, I hope, next year, that the peru- "sal of your paper, (which, in my last parcell, I sent

*The ghost of the "dead French soldier" [see page 26] need not, now, come from the grave to tell us where it grows. Most probably it is the grain of regions bordering on the *Mediterranean*, other than *Tangier*. These, the soldier "had traversed in his campaigns."

"to you, published in the *Farmer's Journal*,) will have "added to the present favourable opinion of that valu- "able root: of which, Mr. *Curwen*, of *Cumberland*, "asserts, he has raised FORTY TO FIFTY TONS, PER "ACRE. I find, in *Essex*, north-east of *London*, it has "become a regular part of the produce of many farms; "and much approved."

Mr. *Curwen* is one of the most respectable men of his country. Therefore, I should have had no doubt of the fact he asserts; on his single authority. But I have had a multitude of similar *European* facts;—which, in the state of incredulity generally shown by our farmers, on all points new to them, I did not venture to mention.

One who asserts uncommon facts, is, most frequently, on all subjects, discredited. In agriculture particularly, it seems that caution is peculiarly required.—The exemplary prudence of one, who, in the most exalted and important concern, promulgated truths, compared to which, all others are trifling indeed; should be recollected, and humbly imitated.—"*I have yet "many things to say unto you; but ye cannot bear them "now.*"

The small specimens of my modern experiments, which I have candidly detailed, are, I think, encouraging. But, I can, after mentioning Mr. *Curwen's* authority, with more confidence declare, that they bear but a feeble comparison with my former experience. Much less can they be considered as complete tests, of the extent to which the culture of this root may be carried. Yet it must be relied on as a powerful auxiliary; and not a dependence in chief.

THE SEASON.

This season has not been favourable to the *roots* of the *Mangel-Wurtzel*; nor, latterly, to the *leaves*. They have, indeed, escaped caterpillars, aphides, and other insects, better than those of many other plants; but the early frosts have nipped and lessened my fourth stripping. The growth of the leaves, in most years, continues late in November. If we have yet mild weather, the roots will increase.

I do not know how it is, generally, with others; but my tap-rooted plants, of all kinds, have smaller *roots*, (the tops being too luxuriant,) than I heretofore remember, in any season. The common beet exhibits this diminutive appearance. My grounds were never better attended; nor in higher condition. Frosts, and cold weather, have arrived uncommonly early. We have had, through the season, frequent cold rains; but few, if any, genial and invigorating showers. A drought at a critical period, retarded the progress of tap-rooted plants; in this quarter.

Hardy, coarse, and pestiferous weeds, of all kinds, have been thrown up in such embarrassing profusion, that I do not recollect ever to have been so much infested by them. Mice, moles, and vermin of all sorts, have been uncommonly numerous. Grasshoppers and crickets, aphides, of countless varieties; and caterpillars, of every size and species, have annoyed us, in profuse numbers;—the *caterpillars*, most remarkably abundant. The latter were stupidly indiscriminate, as to their places of resort; and, not having been governed by the usual instinctive attractions, our houses have been defiled, by their nauseating visits; and vast ag-

gregations have been frequent, in other places, as little likely to furnish their accustomed food. They seemed to be of an uncommon species, for the most part; and they appeared, in the greatest plenty, at an unusual time of the year;—about midsummer;—and continued till the first frosts in October. Our orchards were not, in any great proportion, if at all, their breeding places. I carefully examine mine, and destroy their nests, or webs; or place sods in the crotches of the trees, to banish them, every spring. I found few nests, this season, on the apple trees. Many forest trees invite and support them. None more than the *walnut*, and *wild cherry*. The leaves of most plants, and the foliage of vines and trees, (I think those of young peach trees the least,) have been, more or less, injured, or ruined, by their ravages. It has been unpleasant, in the hottest day, to seek the shade of trees; from whence the caterpillars were continually dropping. Their almost incredible numbers, exhibited, with the aid of their coadjutors in mischief, an epitome of an Egyptian plague. The columns of those creeping spoilers, climbing the stocks of trees, and moving, in hosts, on fences; and their detachments, on grass and other plants; would have furnished, to an uncandid and acidulated *tourist*, (a sort of literary caterpillar,) matter for an episodical philippic on our country;—as if it were generally infested with such nuisances;—which, in any degree like the present, I never before beheld. Warned by the caution I have before recommended; perhaps, I had better have refrained from dilating on a topic, so disgustingly singular.

Birds, and *poultry*, have, in former seasons, preyed on, and thinned the insects. But few of our poultry will feed on caterpillars, unless hard pressed.—I do not remember, in any former year, so many, and so captivating and beautiful a variety of *birds*; as, in the early parts of the spring and summer, filled our forests and fields. They disappeared, as if by common consent, early and suddenly. On their return to us, from their more northern excursions, they made but a short stay. This dereliction gave full scope to the depredations of insects, and other pillagers. Snakes and toads (great destroyers of other vermin) were scarce. But *land-terrapins* were in greater plenty, than I have ever before known. They delight to feed on and destroy *beetles;* and are peculiarly fond of the COCKCHAFFER;* —the parent of the most mischievous *grubs*. The *terrapins* (an excellent esculent, if prejudice could be banished,) are often seen about cow-dung; in search of the beetles; which deposit, and roll up, their eggs,

* The *Cockchaffer* produces the large white *grub*, with a brown, horny or shelly head; turned up by the plough, with the sod; and much relished by birds and poultry; who follow the ploughman, for their prey. It remains in its grub-state, three or four years. It is highly mischievous to grass, or any crop ploughed in with, or sowed on, the sod;—particularly *potatoes*. See *Bath Society Memoirs*, 1787; also *Willich's Domestic Encyclopedia*, article *Cockchaffer*; for a curious account of this *beetle*, or *bug*.

The *beetles*, last mentioned in the text, bring forth the CORN-GRUBS or CUT-WORMS; which have been seen, in great numbers, in an embryo state, in the holes in which the balls have been deposited. R. P.

in balls of this material; which they bury under ground. Hence these beetles are called, by a vulgar appellation. The *terrapins* are, mistakenly, supposed to feed on this filthy ejection; when, in fact, they are only seeking their prey. Of the *beetles*, I have not seen any thing like so many, as I have observed in former years. The *terrapins* have thinned and destroyed them; thereby proving their race to be the farmer's friend. When vermin on farms, or miscreants in society, prowl on one another; the mass of mischief consumes itself.

I have heard some predictions, that the LOCUSTS will appear next season. If so, we could more readily have dispensed, this season, with the scourges of their (I presume accidental) precursors. I have kept no entomological accounts; and cannot determine the period of return of those destructive visitants; in which nurserymen and gardeners, are peculiarly interested. In a former visitation, I lost the greater part of my young fruit-trees. Some of the survivors have, yet, the scars of wounds, inflicted on them by the locusts; fifteen or sixteen years ago.

Information of circumstances known to many of us, may not be necessary, at this time. Causes of increase of the annoyances described, are not easily developed. But some benefits often arise, from recording peculiarities attending anomalous seasons. If the state of crops, and remarkable circumstances, of every year, were annually reported, it would be highly useful.

Our first crops of *hay*, were very abundant; and so were, in general, those of *winter*, and *summer grain*: *buckwheat* (not extensively cultivated, in this part of the country) is an exception. I have heard little of either *mildew*, *smut*, or the *Hessian fly*. The *second crop* of *hay*, was bad. The *pastures*, were much complained of; though plentiful. The *grass* was not nutritive; and did not, as usual in good seasons, promote milk in dairy-cows, or quick fatting, in other cattle. *Fruit*, of all kinds, is bad, and scarce. Our *orchards* have generally failed. Of *potatoes*, there is but a scant crop, in general. I had a good crop; and I have heard of some others. But most commonly I have had unfavourable accounts.

SALIVARY DEFLUXIONS *(ptyalism)* in *horses*, begun earlier, and yet continue more inveterately, than usual; though they have been lamentably common, for many years past. Myriads of small *spiders*, of various colours and configurations, and *diminutive insects*, almost imperceptible to the naked eye, might be seen through a glass, on the stalks and blades of grass. Whether these have any agency, in producing *ptyalism*, I do not venture to determine. Nor do I believe, that the cause has ever been clearly ascertained.* But I have been repeatedly informed, (as I have, on a for-

* There are scarcely any tolerably plausible conjectures, which have not been formed on this subject. But none seem yet to have hit the point. If the spiders and insects were the causes, (and they may so be in some instances) they must infect the grass; so as to leave a taint, or acrid feculence, in its system. For the *hay* of our second crops, has, for a long time past, had the same morbid faculties, with the pastures. Horses and cattle run at the mouth, when fed on it, nearly as much in winter; as in summer on the pastures. My neighbours, as well as myself, have repeatedly

mer occasion, mentioned,) that strewing small quantities of hot, powdered, *lime*, on pastures, (with a view to the destruction of spiders, and other such pests,) has prevented, in several instances, defluxions from horses fed on them. It is well worthy of experiment; and I cannot account to myself why I have not tried it. The whole field must be thus top-dressed; otherwise the defluxions may be caused by feeding on the part neglected. The *lime* will be, indubitably, serviceable to the grass; if it even fails to produce the intended effect.

Such discussions as some of the foregoing, may appear trifling; to the inconsiderate and fastidious. But a farm, like a ship, is often the victim of a combination of destroyers; appearing, individually, the most contemptible and impotent. A farmer should study the habits and nature of *weeds* and *vermin;* to learn how to prevent, banish, or destroy them. A wise and careful *magistrate*, must occupy his mind with the mean-

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thrown out, for litter, many tons of second crop hay; as being found mischievous, instead of nutritive. This effect is not confined to clover;—aftermath of other grasses being also equally infected. *Plaster* destroys insects, quite as much as *lime*. Yet it has been said, (most unwarrantably) that plastered grounds promote *ptyalism*, more than others. Long before an handful of plaster was sown, I well remember this malady in horses. A farm, in my neighbourhood, well known to me, whereon not a particle of *gypsum* (owing to bigotted prejudice) has been strewed; is, and has been for many years, before and since the knowledge of plaster has existed among us, most remarkable for promoting this disease in horses. On the marshes, and other unplastered grounds, it is often as rife, as in any other places. R. P.

est subjects. He never gains, or merits, more celebrity; than he justly acquires, by preventing, or correcting, the vices of the lowest and most worthless of mankind.*

I am your obedient servant,

RICHARD PETERS.

DR. JAMES MEASE.

Secretary of the Philad. Agric. Soc.

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* I have known, in the course of my life, several years, remarkable for insects and vermin, of all kinds. The seasons were always sickly; either for man, or beast. Two of them occurred during the prevalence of the yellow fever, in Philadelphia. They were uniformly bad fruit years.

This season the *dysentery* has been rife; and often fatal. We have lost by it, some of our most valuable neighbours. I have heard of its being prevalent in many other parts of the country. It defied the medical art, if it were not attacked in its incipient stages; and even then, assistance was not always successful. The cases were often attended with symptoms more malignant, than had been heretofore known. The worst cases, so far as my knowledge extends, were those of persons inhabiting near swampy grounds, mill ponds, or dull streams; where bilious complaints had, in other years, prevailed. R. P.

During the past summer, the dysentery has been unusually fatal in Philadelphia. It is commonly a very manageable complaint. J. M.

On Fiorin, by John Clifford, Esquire.

Read, December 14, 1813.

Clifford Farm, November 17, 1813.

Dear Sir,

There have been many publications, and much interest excited among our experimental agriculturists, on the subject of fiorin grass, (agrostis stolonifera) introduced into cultivation by the ingenious Doctor William Richardson, of Moy, in Ireland, whose great industry and perseverance, in agricultural pursuits, has enabled him to give much useful information on that interesting subject, and whose publications on this valuable grass, induced me to take much pains to procure some of the plants from that country. After repeated attempts, I at length succeeded, and now hand you the result of my experiments, as it may not be uninteresting to our society.

On the second of January, 1812, I received from captain Wallington, of the ship Mary, from Limerick, in Ireland, a tub containing a few plants of the fiorin, (say five or six) which he kindly procured for me. They arrived in a very unpromising state, having been wet with salt water on their passage, and to all appearance were dead; I set the tub in my green-house, placing it near the window, to give the plants every chance of recovering, in which I succeeded, and early in the spring set them out in a bed in my garden, and by the autumn they increased so much by stolones, or runners, that I set out as many plants in rows of about

three feet apart, and nine inches from each other, as filled a bed of 29 feet by 32.—This bed was weeded and kept clean, and became covered and matted over with the grass, like a fleece of wool, in the course of the season. On the fourth of the present month I had it cut, and let it remain on the ground until the 8th, during which time the weather was clear and dry, I then had it carefully weighed, and found 165 pounds the result, as follows:

The piece of ground on which the grass grew, was

32 feet by
29

288
64

sq. ft. 928) 43560*(47th part of an acre, less a small
3712 fraction.

6440
6496

165 pounds, multiplied by
47 being that proportion of
an acre occupied.

1155
660

C. qr. lb.
112)7755(69 0 27 being near $3\frac{1}{2}$ tons per acre.

Had the grass been planted in a moist soil, I am confident the quantity would have been much larger.

I am, respectfully,

JOHN CLIFFORD.

DR. JAMES MEASE.
Secretary of the Philad. Agric. Soc.

* Number of square feet in an acre.

Account of a Stercorary, on a large Scale.

Read December 14, 1813.

Belmont, December 8, 1813.

Dear Sir,

I have received the enclosed letter from JOSIAH QUINCY, Esq. of *Massachusetts ;* which contains valuable information, on a subject interesting to all farmers. His account of his STERCORARY, is well worthy our attention. I presume on his forgiveness, when I request you to communicate that part of his letter, to the society. I have a desire, on a personal account, that any erroneous opinions of mine, should be corrected. The opinions I venture to communicate, are always formed from the best information I can obtain; or from facts passing under my own observation. But the experience of an individual, goes but a small way, towards the establishment of a general truth. The *Stercoraries*, I spoke of, in the page of our 1st vol. cited by Mr. *Quincy*, were on a much smaller scale, than the one he has, in a most spirited manner, brought into operation, and most promising use. Many with whom I have conversed, have corroborated my assertions, by similar facts known to them. But Mr. *Quincy* has remedied one evil, attendant on close repositories of dung; and even on some open ones ;—the *dry-rot;* which is a kind of spontaneous combustion. None of those I mention with disapprobation, were

watered. His mode of irrigating, is excellent; and nswers all objections on that score. I cannot conceive, however, unless the extraordinary depth demands it, that the throwing over the muck is indispensable. Yet this must be regulated by experience. I know none so deep as the one he describes; nor should I covet one of similar depth. Nor is the area of any within my knowledge, so extensive; though to this I do not object. The moisture, both intrinsic and adventitious, is retained in deep stercoraries; and thereby fermentation is checked; and a necessity for either throwing over, or long detention of the materials in the pit, created.

In all those I have ever known, under barns, or stables, I have not found an exception to the mischief of the dry rot; in a greater or less degree. They were however, neither thrown over, nor irrigated. The fumes of the hot muck, fermenting under carriage houses in cities, always mould and tarnish carriages, harness, and their furniture. In barns and stables, the air is nauseously infected; and the health of horses and cattle have been considered as injured. Veterinary writers constantly recommend the removal even of foul litter, when horses or cattle are disordered; especially in fevers affecting the eyes, and pulmonary and iliac complaints. Few, if any, of such stercoraries are so well ventilated, as is that of Mr. *Quincy ;* and this is all-essential. One great advantage of those of common depths, is that of superseding the costly necessity of throwing over the muck. It would be well, if more communications were made; that some ge-

neral result might be known. My object always is, to invite others to develope their experience, as freely as I communicate mine.

In my enquiries on the subject of the *yellow-water* in horses, I found discordant opinions, as to the noxious qualities of *stable dung*. Some persons, among whom were some medical characters, did not conceive it prejudicial, when the desolating epidemics raged in our city. Others were of a directly contrary opinion. In all cases wherein there are even doubts, and more so, when opinions are divided; and peremptory on both sides; I hold it most prudent to avoid risk. It is certainly the safest, to place the stercorary in a situation not liable to operate on the air of the stables; and the health of the animals confined in them.

I never found deep stercoraries eligible. The bottoms should admit of the sap of the dung (as the drainings are called) running into pits, furnished with the means of pumping up the drainings, especially after irrigation; and restoring to the heap what it had lost, or otherways using them, at pleasure. No dung, be the quantity what it may, in stercoraries above ground, well ventilated, covered and watered, requires the expensive operation of throwing over; if the materials be properly arranged. If it be irrigated thoroughly, two or three times in a season, artificially, by spouts, to convey rain or other water, it will rot sufficiently and promptly, by its own fermentation; and never become a *caput mortuum*, by the dry-rot. I have said often, that dung more than one year old, becomes carbonated, in a greater or less degree. Its fermentation

ceases; and its stimulating qualities are either feeble, or entirely torpid;* when over-rotted.

Many object to covered stercoraries (though they allow the manure to be the better for being secluded from the sun and winds,) on account of the dryness of the materials; which they conceive, prevents fermentation, and produces combustion. I have seldom found this objection important. But, Mr. *Quincy* has practically established a cheap and convenient mode of irrigation; which must silence all complaints in this regard.

I think some means might be used, for introducing *air*, through the muck of deep *stercoraries;* to promote fermentation, and save the trouble and expense of throwing it over. *Faggots* placed vertically, or horizontally, among the muck, in proper places, would admit of currents of air. *Brick-wells*, or vertical *tunnels*, built higher than the heap, would, at any time, rise; checkered with holes, or vacancies, in the brick work, would both admit air, and drain the muck. These reservoirs might be pumped out; and the drainings thrown over the heap. When the superabundant

* During our revolutionary war, the late general *P. Schuyler* mentioned that he had once purchased a farm from the representatives of an old settler in the *then colony* of New York. A great inducement was, that some thousands of loads of *dung*, had been accumulating, for half an age; it having been considered as useless, when the land was fresh; and thrown into a vast ravine. At first, the dung was operative; but the lower the mass was penetrated, the more worthless it became. 'Till, finally, it would not compensate the labour and expense of hauling it out on the land. R. P.

moisture, introduced by irrigation, was decreased; the fermentation would be accelerated. The *wells*, may be deeper than the bottom of the *stercorary*.

I am truly yours,

RICHARD PETERS.

DR. JAMES MEASE.
Secretary of the Philad. Agric Soc.

Extract from Mr. Quincy's Letter; dated, Boston, November 27, 1813.

"It is now more than a year, since I had the honour of receiving from you some hints on the subject of a STERCORARY, having previously availed myself of those contained in the first volume of your memoirs. The result of my adoption of your hints has been even greater than you promised. I have no question that the saving of manure by a water-tight bottom, and a covered stercorary, will pay me the expense of paving and securing the bottom, the first year; and yet the scale on which I proceeded was not either very limited or rigidly economical. There is, however, one point, in which I ventured to deviate from your suggestions; —rather I had advanced so far in my plan, before I received your cautionary letter, that I could not recede. The result has not been according to your anticipation. And as I have no doubt of the correctness of your opinion, in the general, I think I owe it to you to state the fact of the difference in the result of my experiment, and the causes of it.

You warned me against a stercorary *under my barn*, referring me to p. 153 of the 1st vol. in corroboration of your opinion. I have however as yet experienced none of the ill effects you anticipated—certainly there has been no injurious effect upon the health of my cattle, and from the salubrity of the atmosphere of my barn, notwithstanding the subjacent manure cellar, there is no idea of that kind entertained by any of the farmers in my neighbourhood to whom I have mentioned the apprehension. The truth is, the barn is not at all sensibly affected by the exhalation from the manure heap; or not more than is usual, in this country, where the practice is to expose the whole deposit of the cattle to the air, in an open yard.

In respect to *the inequality of fermentation*, which is another objection, my experience does not evidence it. I have now about *six hundred tons*, in my cellar, which has been collecting about a year and a half. It has been in the course of the summer, all turned over and piled anew from the bottom, and I directed my workmen to attend particularly, if there was any quantity of any importance, "dry rotten, mouldy, or worthless." Their report has been constant as to the perfect state of the manure; except in a very small part which had been pressed by the mass into the parts adjoining the cistern, where, as you state, "the overabundant moisture obstructed putrefaction." This, in such a mass, is of no consequence. And inverting the heap brings into action the desired power.

As I thought I owed to the interest you was pleased to take in my success, this explanation, I ought to add, that I have no doubt whatever, your reasonings were right, and that your experience is supported by my observation in general. The difference arises from

the scale on which my stercorary is built, compared with the common "*pits* and *dung-holes*," against which you so justly warn farmers. The area of my stercorary is 90 feet by 40, the cellar is in the shallowest part 8 feet deep, in its deepest 12, and in the well, if I mistake not, 15.—It is open, nearly the whole length of one of its short sides, and one half of the long, viz. at the north and west, besides large openings at the east. There is always 4 or 5 feet atmosphere above the top of the manure, and between it and the barn floor ; and a constant current setting one way or another. This gives the advantage of a free circulation of air, which in general, in such cases, is not obtained.

The great difficulty I have had to encounter, arises from the necessity of *an equal irrigation* of the heap ; a difficulty, which must attend all permanently covered stercoraries. For water turned upon the heap through spouts, runs in currents, and is not equally sprinkled over the heap, like rain ; which is nature's process in this business. To obviate this difficulty, I have constructed a very simple machine, which answers perfectly. The stone piers, which support the beams of the barn divide the cellar, lengthways, into three equal compartments. I have a box 6 inches deep, 4 feet wide, and about 13 feet long, which runs by means of wheels, upon a sort of wooden railway, made by strips of planks, and fixed about a foot from the floor of the barn, this is perforated with suitable holes. A permanent spout extends through the middle of the cellar, and a moveable spout extends from this to the perforated box—regular openings are made in the permanent spout, which may be closed at will—It is also

closed at the end. By these means the box is filled from the reservoir and pump, and each part successively irrigated, perfectly and with great ease. A man by two days labour, can irrigate my whole cellar, and if effectually done, twice in a season is sufficient.

I have been thus minute, because I thought the detail would not be unpleasing to you, and that I owed it to the interest you expressed in my project."

I have known several stercoraries under barns, succeed satisfactorily to the proprietors of them. Those the best ventilated, were the most profitable. All were subject to dry rot ; in a greater or less degree. Yet the farmers confidently alleged, that even the dry rotted dung, was superior, in effect, to that left exposed in the farm yard. I cannot speak so favourably of it.

R. P.

Plaster, in moderate quantities, assists in the putrefaction of animal and vegetable substances.

Read December 14, 1813.

Belmont, November 27, 1813.

Dear Sir,

I do not wish to prolong a discussion of a speculative nature, for any objects I have in the establishment of an opinion. But, in the hasty observations (made while the press was waiting) on Sir *H. Davy's* conjecture on the causes of operation of the *gypsum;* it escaped my recollection to mention a recent fact on the subject. The use I should then have made of it, would have been to show, that small and contracted experiments, made, in relation to agricultural facts, in the laboratory of a chemist, (however eminent and truly respectable he may be,) are not competent to establish a general principle; though no one can hold in higher estimation than I do, the aid chemistry is capable of affording to agriculture. Nor do I mean to say, that uncommon instances occurring in the fields of a practical farmer, are to be deemed decisive. Mr. *Davy* grounds his opinion relative to the plaster, being, or not, a *septic;* on an experiment he tried on *minced veal*, mixed with the *gypsum*. He found it had no effect in putrefying the meat; and concludes against its septic qualities. Not wishing to load the subject with instances of practical proofs, falling under my own observation, and that of others; which would show that the contrary conclusion (without venturing to pronounce

a positive opinion) would have been most conformable to experience; I shall barely remark; that it requires no small degree of practice to enable any one to form a tolerable estimate (for no accurate judgment has yet been promulgated) of the *quantity of plaster* required for any of the operations, (great or small,) in which it is used. We know that *common salt* in small quantities is septic; but in large portions it is the reverse. Whether the *plaster* does or does not, produce the same effects, no person has yet been sufficiently informed, to be enabled to decide. I have always believed, that there must be an inchoate putrescence in the subject acted on, to give the plaster an impetus; or, at least, to evidence sudden and immediately perceptible effects. I have no doubt that it will, in due time, operate as a principal, be it solvent or septic; but its powers are the soonest perceived, when it acts as an auxiliary. I have found its operation the most prompt, when in contact with muck, or other animal or vegetable manure; in which the putrefaction had commenced; as is most commonly the case in such substances, when collected, and properly arranged.

The fact I wish to mention, will probably furnish speculations to theorists; and some useful information for further experiment, to practical farmers; should it be deemed of importance sufficient to excite the attention of either.

Two years ago, I scowered the ditches of a watered meadow; some whereof ran through boggy ground. I had a great collection of tussocks, composed of aquatic, coarse, grasses and weeds. I composted those materials, in the following manner;—in two heaps. One

contained about sixty two-horse-cart-loads, after it was rotted down; and the other not more than twelve, of the like loads. In the first, I begun with a layer of tussocks; then, a layer of muck, from the stables, in a fermenting state; next, a layer of leaves and wood-soil, (each layer about one foot thick,) until the heap was sufficiently high. On each layer, I strewed *plaster*, very little thicker, than I should have scattered it on grass ground. This was done in the autumn. In the succeeding spring, I began to throw it over; and mixed with it, a quantity of slaked *lime*. I found the heap far advanced in its putrefaction; so that, after being once thrown over, it was (in the fall) in the best order for top-dressing. I never had better compost. There were, (in this heap,) not above four bushels of *plaster*, used. In the small heap, I employed no muck, or dung; but formed it of alternate layers of tussocks, and leaves from the woods intermixed with wood-soil. Each layer was plastered. But the labourer to whom I entrusted this small operation, thought he would supply the deficiency of dung, by an over-dose of plaster. He strewed nearly the like quantity in the small heap, with that mixed in the large one. When I came to view it in the spring; very little progress had been made in putrefaction. I was compelled to throw it over twice, during the summer. I found it, in the fall, unfit for use. The plaster was unchanged, in many parts of the heap. So was a considerable proportion of the leaves and tussocks. I suffered it to remain until the last spring; when I found it but imperfectly rotted; and much of the plaster unaltered. None of the plaster in the other heap, was visible; but

the spot on which the small heap was spread, was universally whitened by it.

Having, frequently and successfully, rotted down leaves, tussocks and wood-soil, plastered lightly; I was surprised at the disappointment in this instance. I cannot account for the circumstance, otherwise than by presuming, that an overcharge of plaster is a *quiescent force;* that is,—it preserves compounds in a state of rest. A moderate quantity may be *divellent;*—that is,—it assists in destroying a state of combination. Plaster must, no doubt, be decomposed itself, before it acts on other substances. So must be marine *salt;* which is also a chymical compound. But whether there be, or not, any analogy in their modes of operating; I do not presume to decide.

The instance I relate, reminded me of the fact, and my conclusion from it, mentioned in our first volume, page 174.—No more of the plaster will act, than the materials, necessary to cooperate with it, require. The balance remains in its original state of composition;—inert and useless. And yet had even the quantity applied in the small heap, had access to all the materials; one would imagine, there were more than sufficient of them, for the pabulum of a larger proportion of the plaster; when it is considered that the number of loads of the raw materials, before rotting down, was far greater than after the putrefaction.

Whether my conjectures be or not sound or relevant, in a chymical point of view, I think farmers may from this and numberless other facts, conclude; that plaster does not operate, like dung, according to the *abundance* bestowed on the ground. At all times, it is

requisite for us to avoid waste; but *now*, a saving of this desirable but scarce article, is doubly incumbent on us.

To a person incredulous as to the efficacy of plaster, this singular instance of its inefficiency in the small heap, would furnish a proof in support of his doubts. Yet it only evinces the fallacy of drawing general conclusions from one experiment, or even a few facts. It shows also the capriciousness, if the term be allowable, of the gypsum. For I do not recollect ever before to have experienced (and multitudes of farmers could attest the like fact) a failure in accelerating the putrefaction, or decomposition, of vegetable matter, by means of plaster. The dried leaves of forest trees, are, however, the most difficult to rot down; unless first used as litter in the stable, or cattle-yard. I am satisfied, too, that (in conjunction with the plaster) the addition of fermenting muck, in the large heap, hastened its progress in putrefaction. It operated, like the stock-yeast in a brewer's receiver, or gyle-ton, to forward the fermentation of the whole mass.

I am your obedient servant,

RICHARD PETERS.

DR. JAMES MEASE.
Secretary of the Philad. Agric. Soc.

Swivel headed Churn Staff.

Read December 14, 1813.

Belmont, December 6, 1813.

Dear Sir,

In my observations on Mr. *Peale's* letter, page 248, 249, of this volume, I mention the subject of BUTTER. I mistook the book through which the information respecting a "*swivel headed churn staff*," was conveyed to me. It is not an "agricultural work;" but "*Nicholson's Journal of Natural Philosophy*," &c. In vol. 26, article viii, the description and account of the churn staff will be seen. I have had much difficulty in getting a churn and staff made; because it was uncommon, and not an object of gain; for the churn and staff, large enough to churn twelve or fifteen pounds of butter, cost but *one dollar and fifty cents*. I promised "to give a fair experiment." This I have done; and can decidedly confirm what is said by Mr. *Fisher;* who received a premium for his invention, from the London Society of Arts. See *Nicholson's Journal*, vol. 26. August, 1810, page 296.

It facilitates the process of butter-making, superior to any other churn, the barrel churn included. A child of five years old, can work my churn, for a short time, with no difficulty; as I have found, by actual experiment. It performs the operation in one third less time, with a like quantity of cream, than the barrel churn; and with much less labour. I find Mr. *Fisher's* observation, that "it must be worked much slower than the

" common, (churn) otherwise it is found to churn the " cream too soon, or, according to the technical term " in his county, to *swelt* it," to be perfectly just. I must therefore modify my remark, as to the *rapidity* of separating the oil.

I had intended to have added another set of vanes, on the staff, some inches above those at the end of it. But I think it best to continue its present form, as a beginning. I shall also try one or two such, on a central rod, inside the wings of a barrel churn. But I am inclined to think, that too much agitation of the cream is not desirable. In winter, this kind of churn can be partially immersed in hot water, to accelerate the process. A barrel churn may so be; but not so conveniently. My people, for small churnings, now, entirely neglect the barrel churn. The size of the churn may be increased, to any reasonable capacity.*

Your obedient servant,

RICHARD PETERS.

DR. JAMES MEASE.
Secretary of the Philad. Agric. Soc.

* See Appendix for account and cut of the churn.

Observations on Indian Corn and Potatoes, by Mr. John Lorain, of Philipsburg, Centre Co. Pennsylvania.

Read February 8, 1814.

Philipsburg, October 25, 1813.

Dear Sir,

I promised to write you on the early planting of Indian corn, and the power which it possesses to withstand frost, in the earlier stages of its growth, and shall now fulfil that engagement; but conceive it will be useful to commence with remarks on the general properties of this plant.

The prevailing opinion is, that the cultivation of this plant is preeminently injurious to the soil, this opinion has been produced by a bad system of management, originating from a thin population, deficiency in capital, and an abundance of fresh, uncultivated lands, for those causes have retarded the progress of all improvements in husbandry here.*

* It is well known, that many of the farmers in this country think too little of returning back to the soil, the scanty aid which even a bad system of management would readily afford, until their fields have been entirely exhausted, and that some have been induced to remove their barns, rather than remove their manure, which in process of time rendered admission to them inaccessible. Only a single shovel full of this manure, applied to each hill of corn, growing on their impoverished fields, would, year after year, (if the practice had been continued,) have produced valuable crops, from the same ground, and in a few years rendered the soil capable of growing luxuriant crops of wheat and grass.

The origin of this error is obvious to me; viz. Maize being a very powerful plant, is capable of contending with an impoverished soil; and when tolerably cultivated, will remunerate the planter on grounds incapable of producing crops of almost any other description, equally valuable, and the farmer abuses this plant, because it continues faithful until the last dying gasp of the soil, which his avarice has destroyed. But it is strange, that men of observation and reflection, viewing the effect without sufficiently examining the cause, have adopted the opinion of the exhausting properties of the corn plant. It is generally agreed, that potatoes, turnips, and cabbages, are meliorating crops; notwithstanding it is known, that neither of those crops will grow on a thin soil, without the assistance of manure, and that if they are continued year after year, (or grown in rotation with others,) without manure, the soil will soon become incapable of producing either of those plants, so as to pay for the gathering of them. This furnishes a striking contrast between those justly esteemed meliorating crops, and the corn plant; for after the former cannot be grown with tolerable advantage, crops of maize, sufficiently productive to induce the continuation of them, may be introduced on the same injured soil, without additional manure: but the fact is, that all the crops that will admit perfect horse hoeing or hand hoeing, may be justly considered meliorating, and also some others, which do not admit this after cultivation, but form a shade sufficiently close to destroy weeds. But it has been well established, that some of the most luxuriant of those crops are great exhausters of the soil; yet they are justly in high estimation; for it being known to every farmer, that they cannot be grown profitably on thin soils, without manure, he readily submits to this necessity; but finding that Indian corn will grow year after year, without manure, he continues the destructive practice of cultivating it in that way, until his fields are ruined, and without due consideration, blames the corn plant for exhausting his soil; an opinion in which he is confirmed from observing the poor crops of wheat he gathers from those fields which have been sown with that grain, among his corn, after the ground had been nearly exhausted, and often overrun with weeds; but being seldom disappointed in obtaining good crops of this or other small grain, after potatoes or turnips, he conceives those plants are exclusively friendly to the soil: they are indeed friendly; for the cultivator is compelled to use them kindly, or lose the labour bestowed on them.

The product of Indian corn being vastly more abundant than any other corn crop, it will demand a due proportion of nutriment from the soil, but will also return much back to it again, even when the grain is not expended on the farm; for the fodder from one acre of luxuriant maize, is fully equal in quantity and nutriment, to one ton of good hay, and the stalks more than equal in value to one ton of straw, for littering the cattle yard; and but few, if any other summer fallow crop, is capable of returning back to the soil, half this amount, unless the most nutritive and most valuable proportion of the crop is added to the amount; and if the grain and fodder of a crop of maize are applied to

the fattening of cattle, it will be found much more profitable than turnips and potatoes from the same quantity, and equal quality of land, notwithstanding a statement directly opposite to this assertion has been published, by a very respectable writer on agriculture: but that statement will be found replete with error throughout; for here again, Indian corn, without manure, produced 15 bushels per acre; potatoes manured, produced 200 bushels per acre, the expense of ten acres of potatoes manured, rated at 36 dollars and 60 cents, when it actually cost nearly double that sum to remove them from the ground, and secure them properly.

That Indian corn does not exhaust the soil more than potatoes, appears clear to me, from some mixed crops of those plants, which were grown on my farm. After the ground had been equally manured, one row of corn occupied the same quantity of soil as was assigned to two rows of potatoes, throughout the fields: the plough was too frequently used in the cultivation of the potatoe crop, and sufficiently in the cultivation of the corn, of consequence, a communication between the corn roots with the potatoes was too effectually cut off. Those crops were removed in the fall, and the grounds immediately sown with wheat, and no perceptible difference was ever discovered in the crop growing either where the corn or potatoes had grown, even where the ground had been but once ploughed for seeding, and that too in the same direction the corn and potatoes had stood. The crops of wheat were abundant, except in one field, which being struck with the mildew throughout, yielded only about twenty

bushels per acre, of light ordinary grain; this crop you saw, previous to this disaster, and admired it much, and you have now in your possession an abstract copy of the accounts kept for the whole of my crops for 1810, and will find a neat clear profit of about four hundred dollars, from eight and an half acres of wheat, grown after a mixed crop of corn and potatoes. In that statement, not only every expenditure on this crop has been deducted, but also a ground rent of nine dollars per acre, and interest on the capital employed in the cultivation of it. No manure was applied to any of these crops, after the mixed crops were removed.

The lateral roots of Indian corn take a horizontal course, filling the ploughed ground in every direction. The finger-like or perpendicular roots dip deep, far below the range of plants in general. I have seen them traced two feet below the level of the ridge in which they grew, with no better implement than a grubbing hoe, in the hands of an awkward workman; how much further proper investigation might have traced them, I cannot determine: but I am satisfied, that they were numerous, and more capable of running deep and collecting nutriment, than they would have been, had nature formed them into one tap root of equal length and dimensions: this opinion is further confirmed, from the well known properties of this plant to withstand drought, of which a striking instance has occurred in my little field, planted here on a high and dry ridge; for no rain fell on it from the 30th of July until the 1st of September, during which, moisture is particularly

wanted in this climate, to fill the grain; yet I have never grown better ears. One just shelled measures one pint and near one gill, but if it had been cribbed, till dried perfectly, might not measure more than one pint.

The prop roots of this plant are wisely constructed to support the great additional height and weight acquired, soon after their appearance, from the shooting of the tassel and ears; for they are stout, and very numerous, and answer the double purpose of props and gathering nutriment; which the plant requires in much greater abundance, than at any other time, for filling the ears. I have seen fields very luxuriant, previous to this very trying crisis, which immediately after, became pale and sickly, and proved unproductive; which is the natural result of crowding the soil with more plants than it is capable of perfecting.

The traces of numerous original corns, are evidently seen in our fields and gardens. Only five of those are in general use for field planting. First, the big yellow and white, in size and form very much alike, the cobs, long and thick, the grains are large, firm, and without indenture; but their size consists principally in their width, which is greatest near the cob, and from this point, the rotundity of their outside surface forms a very considerable vacuity between the rows; and a large circumference, being filled with a few rows of very wide grains, which are short even at their deepest points, covers an extensive surface, without introducing measurement in proportion to the size of the cobs. Secondly, the little yellow and white, resembling

each other in size, form and texture, producing still harder grains, more compactly arranged, but not sufficiently so, which, with shorter and slimmer cobs, render them less productive than the two first mentioned; but they ripen early, and are considered safer crops in high latitudes. Thirdly, the gourd-seed. The cob of this is neither so long or thick as the large, solid corns; but the grains are very long, forming a compact round, from the cob to the outside surface of the ear, and gradually taper to a point, where they join into the cob; of course it is vastly more productive than any other known original corn, but ripens late, and the grains are too soft and open for exportation, unless kiln dried. This variety, so far as my observation goes, is invariably white; for although I have frequently heard of a solid yellow gourd-seed corn, yet on investigation, nothing more has appeared than a mixture of the hard yellow corns, with the white gourd-seed. If such an original, firm yellow corn, equally productive with the white gourd-seed, could be procured, it would be invaluable; but by forming a judicious mixture with the gourd-seed and the flinty corn, a variety may be introduced, yielding at least one third more per acre, on equal soil, than any of the solid corns are capable of producing, and equally useful and saleable for exportation. But this mixture should be with the yellow corns; that colour being greatly preferred by shippers, and is most productive, it having the longest and thickest cobs, and would at least compensate for shortening the grain of the original gourd-seed; provided a sufficiency is introduced to lengthen the grain so far

as will be consistent with retaining solidity, and that yellow tinge required to make it saleable.

The proportion of the big yellow with the gourd seed, may be determined by the length and thickness of the cob, with wide grains; and of the little yellow, by shorter, slimmer cobs, with narrower grains, of a brighter yellow tinge, and an increased number of rows, in proportion to the width of the grains, and size of the cob; which sometimes amount to upwards of thirty, and seldom less than twenty rows. This sort is firmer and handsomer than that formed with the big yellow, and better calculated for high latitudes, but not so productive. I am induced to believe, that by combining those three, the most valuable properties of each, might be concentered in one variety, in a much greater degree, than at first sight appears, by selecting the ears with the greatest number of rows, compactly formed on the cob, and ripening early. The experiment is easy, and the prospect promising; for in the present unimproved state of that plant, from ninety, to more than one hundred bushels of shelled corn, per acre, have been frequently obtained, and when the seed has been improved, and the arrangement and cultivation of the plant better understood, it does not appear unreasonable to suppose, that one bushel per perch, (160 bushels per acre,) will be obtained with equal facility.

Mr. Stevens's crop of 118 bushels, published in your edition of the Domestic Encyclopedia, is the largest I have noticed; he introduced 26,880 plants per acre. A large ear shells one pint of corn; moderate

sized ears will average more than half a pint; if each plant in his field had produced only half a pint of shelled corn, his crop would have yielded at the rate of about 200 bushels per acre, of consequence the number of plants, or their arrangement, or, perhaps, both those causes combined, injured his crop. And the same cause produced similar effects in my crop of 91 bushels, grown in the year 1811, in double rows, on ridges half a perch asunder. The number of plants not exceeding 20,000 per acre, were too much crowded, and leaned out from the ridges into the intervals, to procure the air, until the tops of the plants standing on opposite ridges, intersected, and those which got undermost in the scuffle were entirely barren; and those which predominated, had the shortest ears which had ever been grown before by me; but still the greatest crop of corn. If the same number of plants had been introduced on the same ground, in single rows, at half the distance, it appears reasonable to suppose, that the crop would have been much more productive, but whether so many can be arranged on an acre, so that they will produce large and perfect ears, is unknown to me. Those crops are merely introduced to show, that large increase does not always determine judicious management of the crop; and that if cultivators would carefully observe the progress of their crops, and publish their errors with the publication of the management and the result; those errors, instead of being copied and perpetuated by others, would be avoided, and the knowledge of agriculture rapidly increase.

I introduced the greatest crop of maize that has been

published, with another large crop, to show that great increase has been obtained, from very injurious arrangements of the plants, and that much greater might be acquired, if we knew how to arrange the full complement which the soil and climate are capable of perfecting. But it is far better to introduce too few, than too many plants, for in the first case, a good crop is insured, while in the latter, the soil is uselessly exhausted, and the crop is rendered precarious.

Corn should be planted early, more especially in high latitudes, where the farmer's expectation is frequently blasted by an early frost, or a cool spring and summer procrastinating the growth and maturity of the plants; and this evil is increased, if he cultivates the larger and more productive corns, not only as it affects his crops, but also as it establishes the erroneous opinion, that they cannot be grown. But I had been prepared to encounter those false opinions, having planted, my crop much sooner than my neighbours, and observed that maize, in the early stages of its growth, was not subject to such injury from frost, as was generally supposed. For though its tops were frequently turned yellow, and sometimes severely scorched, the roots were established early in the soil, and the plants pressed forward with great rapidity; and no question with me, derived at least as great advantage from early planting, as barley, or any other spring crops. And it frequently occurs, that the weather is more favourable for vegetation in April, than in May, at the usual time of planting; and the ground, early in the spring, is less subject to become dry and crusty, which often pre-

vents the plants from penetrating the soil. The Indians' ideas of planting, are suited to their limited observation; but we see those trees which are generally in blossom at the time of planting corn, are sometimes in full bloom, in February and March. I have not been long enough here to determine how much later spring generally commences here than with you: but believe it cannot be less than two weeks. My corn, and that of some of my neighbours, was planted the last day of April and the first day of May. The weather was mild, and continued so until the 13th of May, when some white frost appeared on the fence rails and bridges. On the 14th some of the corn came up; on the 16th considerable white frost, and ice were also seen in an earthen pot, standing on boards in my yard; on the 17th, the ground was frozen in the bottoms, and ice in troughs, and the same occurred every morning until the 22d, during which the corn continued coming up, and few, if any of the plants were destroyed, although some of them were killed level with the ground. The tops of early planted potatoes were killed, but the crop was abundant. Beans fared worse, being incapable of a general recovery. The older settlers say, this was the severest frosty time, they have seen here at the same season of the year. On the 19th of August there was a considerable white frost, with ice. The upper blades of the corn were wrinkled from twelve to fifteen inches from their points, and hung downward, but generally retained a healthy, rusty, weatherbeaten, green. From this, injury was expected, but none appeared in the crops. The next

frost occurred on the 6th of October, and finding the corn plant debilitated by age, it scorched it excessively; and another on the 11th killed it effectually. I have never seen better ears of corn, than were grown in those two crops, when for forty miles or more round, we hear of no good crops, not even on the Susquehannah and other rich bottoms, justly famed for growing corn; except a field grown by a neighbour, which was planted from the 11th to the 13th of May, and that part of his crop seeded with the same kind of corn grown by me, to wit, highly impregnated with the gourd-seed, was not perfectly matured. This general failure in crops of corn, has been commonly attributed to a great redundancy of wet, during the spring and first summer months, and an unusual drought in the latter part of the summer. But the fertile fields mentioned above, were subjected to the same, therefore those causes could have had no general effects elsewhere, except those arising from late planting, which the difficulty of the seasons have rendered more conspicuous. From these facts, I infer, that early planting of corn, more particularly in high latitudes, would augment the general crop to an immense extent.

A grass lay is vastly preferable for corn. The very minute division of the soil, by its innumerable roots, with their fermentation and decomposition, furnish considerable heat and nutriment, and introduce cavities in due proportion to the number and size of those roots, keeping the soil open and mellow, for the ready admission of the corn roots. Stable, or other animal manure, should be spread regularly over the lay. But it is seldom properly done, in the usual random mode

of dropping the heaps. The field should be staked on one side, and each end; the distance of one perch is convenient for spreading, and will readily determine the number of loads per acre, with the size of the field. The dropping of the heaps, commencing along the stakes on the side of the field, with the stakes at the ends, insures regularity. If patches appear materially thinner than the soil in general, they should be marked, and additional manure spread over them. The sod, with the manure, should be regularly turned under, with one deep ploughing, or by trench ploughing, which is far preferable; for it will furnish a surface readily pulverized with the harrow, and bury the seeds of most weeds beneath the power of vegetation, and provide larger scope for the roots of the corn. It is said the skim coulter plough, will effect this purpose equally well, and with much less labour and expense. If obstacles prevent trench ploughing, the furrow-slice must be compressed with a roller, and the ground harrowed lengthwise the furrows, sufficiently to close the seams between them, which greatly prevents the growth of the grass. If the cultivator wishes to introduce lime, it may be spread now, with great advantage, and mixed by the harrow with the upper surface of the soil, without injuring the animal manure by its caustic properties: for the cultivation of the crop, and those succeeding it, if readily and effectually executed, will keep the lime near the surface, until it is sunk by its own gravity. Wide intervals, or right angles may be formed, sufficiently correct, with the plough, if they have been regularly staked out, but crossing those furrows, for narrow distances, on the rows, and

striking the smaller angles, require mathematical proportion, to admit ready and effectual cultivation. The four furrow wheat drill in your repository, will furnish simple principles for forming a very cheap implement, to effect this purpose.

For dropping the seed, cut an elder stalk of about one inch diameter, just below a limb, which will form a handle; cut and hollow it out above, to hold the number of grains planted, paring the upper edge thin: with this and a small basket, a little boy or girl may drop three times more than a man in the usual way, and more correctly. If two plants are designed at each angle, eight or ten grains should be planted; for numerous birds, and cut-worms, will have their share, and some of the seed will rot, and many that vegetate will not get through the soil. The extra expense of seed is scarcely worth consideration; while replanting is very expensive. Where the planting fails, it will be more profitable to introduce three or four bunch beans, or a potatoe, for neither require hilling, if planted at a proper depth, and the latter will certainly be more profitable than replanted corn. The seed should be covered no deeper, than one inch, with the loosest, moistest, and best mould at hand; and no clods, or other obstacles introduced; moderately patting this covering with the hoe, to secure the moisture. If the soil should form a crust over the seed, near the time of its coming up, the clusters must be daily examined, and when the points of the plants turn downward, they should be liberated immediately, by carefully breaking the crust. I have saved one field of corn by this practice, which must have perished without assistance. This may be readily done, with a small rake, the teeth formed with nails, whose edges have been previously blunted: but a three forked hook, in the form of those used by gardeners, is preferable.

Farmers have been told, and might have seen, the very superior properties of a grass lay for corn, but many who do know it, have not appreciated the advantage, or they would not grow other crops, for the express purpose of subduing the grass, previously to the cultivation of the corn. The cultivation of corn should commence, so soon as the first leaves expand; otherwise grass and weeds will take the lead; hence much labour is saved, by commencing their destruction before they are established. On the proper or improper management, at this critical time, the prosperity of the crop greatly depends; for, if the plants now scarcely three inches high, are pulled up from a free open soil, the roots will be found more than twelve inches long, besides what remain in the ground. Where superficial roots abound, the shovel plough should be used, for the cultivation of the crop; but if those do not exist, a hoe-harrow is much better, and greatly superior to a mould board plough. This circumscribes the roots of the plants, forms ridges and furrows calculated to turn off the rains, and by turning up the grass sods, with the seeds of weeds, causes much useless labour from the growth of both; stops fermentation and decomposition, forming channels from which the heat, moisture and nutriment already accumulated, escape, exposing the manure to be washed away by rain, and exhaled by the sun. The hoe-harrow will more effectually pulverize, and clean the soil without

producing any of those injurious effects, and with half the labour, provided a triangular harrow, with tines and handles, follows, with hand hoers after it, to eradicate weeds and grass near the plants, and uncovering and setting up the plants at the same time. The hoe-harrows should have handles, and be formed to close or expand behind, to suit the cultivation of the plants, in the different stages of their growth, with three triangular hoes, supported by coulters, sharp in front and point, for the smaller sizes, and five for the larger, formed and fixed effectually to cut all the ground to the extent of their spread: if wheels were added, they would ensure any desirable depth, with perfect regularity and ease.

Although the open texture of a grass lay admits very early cultivation, after rain it may be too soon done, and cause serious injury.

If the corn has been planted at right angles, the harrows should operate, in the first cultivation, through both directions of the field; first lengthwise the ploughing, and progress until the soil is well pulverized, and the weeds and grass within their reach, entirely destroyed. This will leave little for the hand hoers to do, and the field will be properly cultivated. The supernumerary plants must be pulled up, so soon as the seed at the root disappears, but while a vestige of it remains, squirrels will pull up the plants.

The suckers growing at the joint, in contact with the ground, and the next joint above, should be pulled off so soon and often as they appear in sufficient size to admit the operation. When suffered to become numerous, and large, the nutriment required for their

support, with the large and numerous wounds inflicted at once, injure the plants excessively, at the time they require every possible assistance from nature and art. In the second cultivation, the harrows should stop a few days after they have effectually destroyed the grass and weeds, in one direction of the field, allowing time for the mangled and misplaced roots to form a sufficient establishment, to support the plants after they have been subjected to the same unavoidable injury, by the second harrowing. This precaution must be observed if a third cultivation should be found necessary; this may in some measure depend on the seasons, but principally on whether the lay has been ploughed sufficiently deep, and the grass turned under. If this has been done, and the execution of the first and second cultivation effectually performed, the farmer will generally controul the seasons, and sometimes derive advantage from occurrences which prove very injurious to the crops of his less provident neighbours.

To ensure good crops of corn, the cultivation with the harrows must be accomplished, before the tassels and prop roots appear, for after this, the plants requiring all the nutriment which nature and art can supply; their roots should remain perfectly at rest. Still a harrow with blunt or worn tines, may be advantageously used in wide intervals, which favour the growth of weeds, longer than narrow. But this harrow can have little effect among weeds already established, and seldom does much good when contending with grass; therefore the farmer should see the absolute necessity of pressing on a cultivation, to give an early and safe rest to his crop, more especially in narrow intervals,

where the size of the plants will soon render the introduction of the harrow impracticable. For although their shade will smother many more weeds than when the intervals are wide, still far too many will remain for the hand hoers, either to pluck or cut off, if the previous cultivation has been procrastinated, or imperfectly executed.

The plants should not be cut off or topped and stripped, until the grain has attained a tolerable solidity, and the milk has entirely disappeared, unless the plants have been killed by frost; in that case they should be immediately cut off, or topped and stripped, to admit the sun and air to the ears. Some say the latter is the surest practice in high latitudes, where the sun is less powerful, and where more cloudy and dripping weather prevails; but others think the former safe, if the plants are set up in small heaps; and that it is the best way, my experience will not authorize a decision. But I do know, from actual and well tried experiments, and regular accounts, that cutting off the plants saves the fodder better, with one half the labour. With an old sithe, crooked at the point, and rags wrapped round the heel for a handle, a man will cut off at least as much more corn, as he could with a hoe, and with greater ease to himself. While he grasps the plants with one hand, he cuts them off at one stroke with the other, and by poising their buts with the point of the sithe, lays them regular with great facility, for the carters. A wooden handle would improve this instrument. The plants may be set up in heaps of six or eight feet diameter at bottom. After the corn has been husked, three or four of those heaps, set up in one,

and banded with the stalks, preserves the fodder better than stacking, where the moisture accumulated in the stalks, introduces mould: much labour will be saved by setting up the corn in the field where it was grown, if the fields are not cultivated, until the ensuing spring, in that case the difference in labour, compared with topping and stripping, will be still far greater. Hilling at any time is destructive, it cuts and confines the roots within a narrow compass, and turns off the rains; exhausts the plants by compelling them to form fresh sets of roots, at the expense of those already established, converting the prop roots into common roots, and forming other prop roots from the joints above, which seldom get established in time to support the plants.

I should have mentioned before, that a grass lay is more especially necessary for corn, when it is planted on a flat retentive soil; for unless the ground is very much disposed to wet, it will preclude the necessity of ridging, and the lay forms a tough surface for hauling the manure, which eases the draught. Each furrow-slice forms an effectual underdrain, more especially if the field has not been pastured or mown in the fall, and the furrow-slice is only moderately compressed with the roller, and if a man with a shovel and mattock, follows in the furrows, leveling the heights, removing such roots, stones, &c. as will obstruct the course of the water, forming cuts across the head lands, at convenient distances, for its escape. Tens of thousands of wheat, and other grain fields, are annually injured to an immense extent, through inattention, or to save this trivial labour. The water is stopped in the fields

by the obstructions in the furrows, and backed on them at the head lands, or finds a passage over the declivities, sweeping the soil and plants before it, forming innumerable gullies, none of which would appear, if the furrows were opened in proper directions.

Mixed crops of maize are profitable, and believing my crops of this description, have been more productive than any of the same sort, which have been published; the errors in management, with observations on them, may be beneficial. Accident in my crop first published, led me to expect considerable advantage from ridging for corn; but have since found that it was an increased quantity of soil and manure, introduced by the ploughing, that rendered the plants on the ridges which had been accidentally formed, better than the rest of the field, and not, as was supposed, the concentering a double quantity of manure under them; and that ridges produced artificial droughts, without any perceptible advantage from them. I also believed, and continue in the same opinion, that wide intervals, admitting large scope for sun and air, permits the introduction of numerous corn plants with safety, in the rows, and that this is the principal cause why corn is more productive in proportion to the soil occupied by it, when mixed with low growing plants, more especially, if the cultivation of the crops, cuts off the communication between the corn plant and its neighbours, which has been the case with my crops, till a trivial experiment made last summer; and till then, close planting on the rows had been entirely overdone by me. My mixed crop of corn and potatoes, for 1810, published in the second volume of the memoirs of

your society, did not discover the impropriety of such close planting, for the failure in corn plants, reduced their number very considerably. But more experience and observation have taught me, that the potatoes planted in that crop, were much too thick, and if two single, instead of two double rows, had been introduced, and planted deeper, the crop would have been much more productive.

My mixed crop of corn and barley, for 1811, clearly discovered the error of too many corn plants. The barley was sown at the rate of three bushels per acre, on six feet beds, and the corn planted on ridges of the same width; the produce in barley at the rate of 36 bushels per acre, and of shelled corn, 138 1-2 bushels per acre. The corn in the ridges was certainly too thick, about 64 plants within the length of one perch, planted triangularly, in double rows. Many plants were entirely barren, nubbins numerous, and the ears generally very short, and badly filled. Although one of the best ridges, husked and shelled under my own inspection, measured at the rate of 152 1-2 bushels per acre, and another ridge, ordered in the same way, at the rate of 149 1-2 bushels per acre, still, every person who saw the crop matured, joined in opinion with me; that half the plants would have produced much more corn. What might have happened, if the soil had not been generally very thin, previous to manuring, for those crops, or if a sufficient quantity of manure had been introduced to supply this defect, I cannot determine; but where the soil was good, evident marks of the injudicious practice, of this close, hedge row planting appeared.

Last spring I planted on one side of my garden, Indian corn, with intervals of six feet, two plants eighteen inches asunder in the rows; the soil appeared good, and the plants were dressed with leach ashes. They were stout, and the ears well filled, although the soil is stiff and disposed to bake, and the latter part of the summer was dry. The only cultivation of this crop was with the hand hoe, until narrow strips were broke up deeper, for the introduction of cabbage between the rows. This mode of planting introduces 9680 corn plants per acre, with an additional produce from one row of potatoes between the rows; or, the large white kidney bunch bean may be introduced, provided neither are hilled or hoed up, for by this practice, the roots of the corn plants will be greatly circumscribed, and compelled to take directions so opposite to nature, that they could not prosper.

If potatoes are planted between the corn rows, the lay should be well turned, eight or nine inches deep. This will introduce no extra labour; for that depth, though not absolutely indispensable, is requisite for the corn crop. A narrow strip, for planting the potatoes, should be well pulverized with a small hoe harrow, without turning up the grass. The ridges formed by opening the furrows, should be turned back for covering the seed. If potatoes are planted at a proper depth, I do not believe that hilling up that plant is so advantageous, as most farmers imagine. It is certain, they too frequently injure the produce by this practice; and their management of it is frequently inconsistent throughout, for they provide a light covering of long manure for planting, and during the cultivation of the

crop, heap up on the ridges an enormous weight of mould, and frequently poor cold clay, destroying numbers of the plants, which in a potatoe crop are frequently far behind in vegetation, and greatly injure others of the same description; cutting the wire or fruit roots, and oppressing the bulbs which escape, with a weight that prevents due expansion. And this is not all the evil produced, for trenches are formed below the level of the roots, which greatly increases the artificial droughts.—The largest crop of potatoes I ever saw grown but one, was obtained from a stubble field without manure, planted in every furrow, and cultivated with the tined harrow alone, although this mangled some of the plants greatly, and injured others in a less degree. For several years my early potatoes for family use, have been planted in the Irish way, on beds, and have ever been productive and good. This year some of them weighed one pound, which were larger than any early potatoes grown by me before.*

Your's, with respect,

JOHN LORAIN.

DR. JAMES MEASE.

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* Observing a publication promising layers of potatoes succeeding each other, if the plants were hilled beyond the common practice, two varieties were cultivated by me in that way; the plants were regularly ridged, or rather banked up, with good mould, until killed by frost, and then the ridges were regularly removed. Numerous roots appeared in due succession on the vines, but the fruit was found where nature designed it should grow, to wit, at the bottom, and was greatly inferior in size to that grown in the usual way. Still it might have been otherwise, if the hilling had ceased sooner.

On Grass Lays, Manures, &c. by Mr. John Lorain.

Read February 8, 1814.

Philipsburg, January 1st, 1814.

Dear Sir,

If grass lays and farm yard manure were properly managed and applied, the productions of agriculture would be doubled; and one half the usual labour in the process of farming saved; but this has been little considered, and less practiced here, and also in England. Both they and we know the merits of a clover lay, for wheat, but it is seldom properly applied; as more than one half the roots are frequently hove out by frost, previous to being turned down for wheat. For the lateral roots become weak, and incapable of holding the plants in the ground, more than one winter, and the second year's mowing is light, and the lay very indifferent for wheat. It is strange that the valuable properties of clover lays, so long established for wheat, have been extended to so few cultivated plants; and that it has not led us to reflect more on the value of grass lays of every other description, more especially in a new country like this, where those lays have been so frequently and successfully applied for the construction of gardens. The cause is obvious, and has been defined in my observations on corn. The grasses are nature's pabulum of cultivated plants, and if properly applied, will create good soil where it never existed before; and will communicate sufficient

adhesion to light blowing sands, for growing luxuriant grain crops; and red clover, with the aid of gypsum, will in this highly favoured country, enrich a thin soil to an almost incredible extent, in a very few years; and will plentifully replenish the farmer's mows with excellent hay, if a proper system of management is pursued. If this grass is mown instead of pastured, it will soon render the effects of wild garlic perfectly harmless, either in the dairy or grain fields, as I know from what was effected on the farm lately occupied by me, which was overrun with this pest.

Man, in all his pursuits, is too fond of complication, or we might have been long since taught the proper application of manure; for a smoking dunghill, with the aid of our eyes, nose, and reflection, should have instructed us, that farm yard manure loses at least a full half of its most valuable properties, if kept over spring and summer. Some gentlemen imagine that fermentation and decomposition produce combinations and properties highly beneficial; but this appears to rest on conjecture; for they differ widely in what those properties consist. Observation and practice have taught others, that when the manure is turned under the soil, previous to fermentation, nature performs those chymical operations within the soil, spreading the riches of the manure through it, with the least possible loss, provided she is not counteracted by an injudicious cultivation, and that immense, and very injurious labour is saved in extra hauling, and mixing the manure with other substances, which are much readier, and (very generally) far better applied, before or after the manure.

They plough, harrow and hoe their fallow grounds through spring and summer, effectually destroying the weeds, but introduce those pests in great profusion, with the farm yard manure, applied previous to seeding their crops. It is readily granted, that the application of manure in a progressed putrefaction, will greatly hasten vegetation, and if the crop is not laid, which too often happens, when applied to wheat and other small grain, the produce will be increased. And it is this, which has led to the erroneous opinion of the proper application of manure, and has sacrificed to the trivial, and at the same time, very uncertain advantage gained in one crop, the future prosperity of the soil, and ensuing crops, to an amount fully equal to the loss sustained in the nutritive and stimulating properties, contained in the manure.

The spire grasses are much hardier than red clover, and will be found troublesome companions for wheat or other small grain, unles the furrow-slices are well turned, and the seams between them, well closed with the harrow; but this is readily done, where stumps, roots, or other obstacles do not abound; and if our native, simple, and very cheap four furrow drill-plough is introduced, a man, with a boy and one horse, will effectually seed and cover with it, at a proper depth, more grain than can be sown and covered with two horses, and the harrow, in the same time: provided a rake with tines, calculated to cover the grain, is attached to the hinder part of the drill; and should a few stumps be in the way, the man lifts the plough quickly over them. In the spring, an intelligent boy, with one horse, will effectually horse hoe, with the

same instrument, more acres per day, than were sown by it in the same time; and if another rake is constructed, with the tines to run in each furrow, and overturn some weeds cut off, under the surface of the soil, which have escaped being turned over with the hoes in the drill, the cultivation will be as complete as can be readily imagined; this rake will also effectually cover the grass seeds, which should be sown previous to the second horse hoeing. Both of those rakes should be fixed, not to swerve in the least from side to side, but to traverse readily up and down.

To be better understood, it may be necessary to apply the system recommended, to a round of crops, leaving the farmer to apply the principles of it, to such crops as may be best suited to his market and purposes; for with prudence he may grow any. The cultivation of the corn crop, furnishes an open, free soil for barley, in the spring. The decaying manure and roots of the grasses have not been exposed to loss, the weeds within the power of vegetation, have been generally destroyed, and it being an object of high consideration, that all the seeds of weeds, which can be avoided, should not be turned up, and the riches at the bottom preserved, a large hoe harrow, calculated for two horses, should be introduced. Implements of this description, but more expensively formed, are called by some, *cultivators*, and are sometimes made very large, but those spread over too much ground, to effect good cultivation, in the uneven surface of fields generally. That proposed will cultivate the soil effectually for the barley, and with half the usual labour, and if the farmer wishes to introduce beans, or any

other fallow crop, previous to the barley, the same tool will effectually cultivate the soil for both crops: and if the grounds are sufficiently rich, this intermediate crop will be an excellent practice, for it will more effectually destroy the weeds, brambles, sprouts, dock, or other hardy root plants, which have been crippled, but not eradicated, by the cultivation of the corn. If wheels were added to the hoe harrow, the difficulties mentioned before will be avoided. These may be readily made of thick, hard plank, dubbed to form naves and rims. Clover seed should be immediately sown over the barley, and brushed in, but a light harrow will not drag the soil, &c. in heaps, on the surface, or if spire grasses are preferred, they may be sown in the room of clover, and covered in the same way. The clover or spire grasses should be mown but one summer, and the lay with a second or good third crop, turned under, not more than six inches deep, in the fall, for wheat. This leaves the manure and numerous seeds of weeds, which had been turned under for the corn, still at the bottom. On the wheat, sow orchard, oat, or timothy grass seeds, the two former immediately well harrowed in, with a light harrow, or the common harrow brushed, for although this may bury some seeds too deep, the deep rooting of the plants saves them from being hove out by frost, which generally destroys those which root on, or very near the surface, and if those light, chaffey seeds, are sown on the settled ground in the spring, they rot on the surface, and are blown away with the winds. Timothy or clover prospers well, when sown on wheat, very early in the spring, but are frequently very injurious to the grain crops, if

sown in the fall. In some climates and seasons, February will suit better for sowing those seeds. The spire grasses sown on the wheat may be mown two years, if the farmer's cattle yard will admit a plentiful manuring for maize; if not, the ground should be mown or pastured until this can be done, but the sooner the lay can be turned, consistent with the preservation and improvement of the soil, the roots of the grasses will be oftener brought into use, which hastens the improvement, from the frequent decomposition, of their full growth in the soil.

A gentleman whose extensive talents should be respected, has published, that wheat sown in England, from two to three bushels per acre, yields great crops, where the soil and climate are favourable to its growth and perfection, but that the same quantity sown here, would yield straw, without grain. This is entirely opposed to my practice and observation, and nursery men who have long sown and planted there and here, agree, that the same plants will double the size here, in one season, which they generally attain there in the same time; and certainly our climate is much better calculated to ripen a heavy crop of wheat, than the climate of England, where a less powerful sun, and frequent cloudy, dripping, foggy weather, injures those crops to an immense extent, and compels the inhabitants to become tributary to us, and other nations, for bread. But the real state of the question is simply this;—the Hessian fly has darkened knowledge, but having compelled us to manure our grounds, one corner of many a field, now produces more, than the whole previous to this visitation. And if farmers had considered ob-

servation and reflection, necessary ingredients, in the composition of their business, millions of bushels of wheat might have been grown, which have been entirely lost, from a deficiency of seed. But even a loss like this, has not been sufficient to awaken those men, who conceive they inherit from their fathers, the same fee simple in the knowledge of agriculture, as they acquired from their will or death, in their estates, although if they had acted wisely, the manuring of their grounds would not have been the only advantage derived, from this potent insect, for before their depredations, wheat was sown very early, and where the soil was tolerably good, a trivial quantity sufficed; for the plants tillered very profusely in our prolific climate; where copious showers, succeeded by a clear sky and an animating sun, are peculiarly favourable to vegetation. But since this supposed calamity, wheat has been sown later, and the same quantity of seed generally continued, although farmers might have seen that less vegetated, more plants were killed by frost, and that they tillered less; and that all those deficiencies increased in due proportion, as the season had advanced previous to seeding; of consequence, when farmers will be persuaded to sow a sufficiency of seed, to introduce the same number of stems, as were formerly grown, from very early sown wheat, they will obtain as good crops as were formerly grown, and probably much better: for they will introduce many more plants than were produced from early seeding, and the same number of stems, nourished by many more original roots, each proceeding from its own grain, which will certainly be much more productive, than the same

number of stems, supported and nourished by much fewer original roots.

To illustrate this, I could readily refer to numerous tillering or suckering fruit-bearing plants. Thus, one grain of corn will produce numerous stalks, but their production is found trivial, when compared with the same number of stalks, standing also in one cluster, but suckered, and each proceeding from its own grain, and supported and nourished from its own original root: and were it not too laborious to sucker wheat, to one stem, and a sufficiency of seed was introduced to meet this practice, it would soon display crops exceeding credibility.

When wheat is sown in a climate similar to that near Philadelphia, previously to the 15th of October, two bushels per acre may be found sufficient, increasing the quantity, in proportion as the season advances, until the 5th of November, after which three bushels will be found little enough.—If barley or oats are sown early in the spring, three bushels per acre may suffice, particularly of the former, but an addition, equal to the progress in season, should be added to both, for they also tiller, in due proportion to the time when they are sown. I believe that little, if any seed can be saved, by the drill, without very serious injury to the crops, and this opinion is progressing in England, where a false economy in seed, for a long time prevented that full display of the very superior crops, which may be grown, when this instrument is properly applied. Englishmen sow grass seeds profusely, and in this they are perfectly right, and excel us greatly, who sow far too little, for this economy in seed, gives rise to nu-

merous weeds, where grasses would abound, if a sufficiency of seed was sown, and introduces tussocks, the curse of bad husbandry, which compel high, wasteful mowing, difficult ploughing, and furnishes a poor, starved lay for cultivated crops.

Here I wish to be understood, that nothing will supersede the necessity of farm yard manure; for although it is very probable that a judicious farmer, with a very circumscribed capital, might profitably extend his cultivation, to many acres of ground, with but little aid from farm yard manure, by ploughing under the tops and roots of the grasses, yet I do know, that in general, a farmer whose capital, with the workers in his family, might enable him with industry and good management, to extend advantageously his cultivation to a farm of twenty acres of ground, is very seldom satisfied with a hundred, although he continues poor on the latter, and might become independent, and comparatively rich on the former; and it is this, and not maize, which has impoverished so much of the American soil, and stripped off the timber, which nature had liberally provided for many ages yet to come. Those who possess a fee simple in property, may do as they consider best; but those who let lands to others would act wisely, to circumscribe the plough and the axe, within the limits of their tenants' capital, for until this is done, the soil will be ruined, and the timber wantonly destroyed. The fall of the leaves and branches will continue to enrich the wood land, and if fences are kept up round the cleared grounds, nature will in this country, soon cover them with white clover, and other grasses, and the decay of their roots and tops

will slowly enrich the soil, and if cattle are admitted, and not suffered to carry off at night, the greater part of what they have gathered in the day, the same purpose will be sooner effected.

When practices are recommended, without explaining the principles on which they are founded, they can do little good, unless the reader's reflection supplies this deficiency; and when a farmer is in possession of the principles, on which a practice is founded, he may readily determine whether they are consonant with the operations of nature, and if he finds them inconsistent with this criterion, they should be rejected; even if sanctioned by men of talents, and backed by very large crops; unless he clearly discovers, that no other agency, but that recommended, could have effected the purpose: for men of genius are sometimes egregiously mistaken, and crops may be grown to a wonderful extent, under a system of very improper and expensive management, when capital, talents, and attention are employed, in the production of them.

Agriculture might be highly improved, were farmers convinced that a small knowledge and application of arithmetic, is indispensable in the practice of an improved husbandry, and that perfection in this art will never be attained, until calculation clearly defines the quantity of seed, and proper depth and distances for sowing and planting. Not only a great increase would certainly follow the introduction of those principles, but random practices would be abandoned, from which certain information can seldom be obtained, or communicated so as to be clearly understood. Much labour would be saved, for when any business is pro-

perly simplified, it is more readily managed, even with inferior powers of body or mind, and always much sooner and better done. A boy or girl, under mathematical arrangements, would frequently do more, than an active man in our present random practice.

It is from gentlemen farmers we are to expect the introduction of good farming. Their previous pursuits forms habits of observation, reflection and calculation. But gentlemen most generally commence farming, without practical knowledge of the business; and a multiplicity of books, though containing much useful information, introduces great confusion, until the gentleman becomes better acquainted with agriculture, which frequently never happens; for serious expenses, and mortifying disappointments, induce many to quit farming, who would have been ornaments to that profession, if they had set out right at first.

Your's, very respectfully,

JOHN LORAIN.

DR. JAMES MEASE.

The Society have declared on a former occasion, that they publish impartially all communications; and do not deem themselves answerable, except in cases wherein they expressly take responsibility. They have inserted the above from their valuable correspondent, on the principles here stated. Some of the ideas are not in unison with opinions commonly entertained.

Usefulness, to Husbandmen, of attending to natural Phænomena, by Richard Peters.

Read February 8, 1814.

I know not whether the account I gave, of some of the prominent circumstances of the season of 1813, may, or not, claim any serious attention. It would be well, however, if observations on seasons of every description, either favourable, or otherwise, to the business of the farmer, were more commonly noted. Although some circumstances may, at first, appear trifling, and not worthy of any attention; yet, in a course of time, they may be found highly important. Much of VIRGIL'S GEORGICS, is devoted to the signs and motions of the heavenly bodies,—the *phænomena* exhibited in the air, and in the ocean,—according to the state of knowledge in his day,—the habits of animals, —including reptiles and insects, however mean, and otherwise insignificant. He draws, out of these, instructions and warnings for husbandmen, written in a style of elegance, and even practical correctness, which have not been surpassed in modern times; with all their boasted improvements, in science, or the arts. The great character *Linnæus*, whose acumen of research pervaded all nature, has not disdained to investigate subjects, which would appear unworthy his notice, but for the interesting uses, to which he applies them. The times of arrival of certain *birds*,—the appearance of certain *flowers*,—the vegetation of certain

plants and *trees*,—are all enlisted into the service of the husbandman; and rules suggested, drawn from *natural phænomena*, which are practically useful, as to times of seeding, and other operations in agriculture. So far are circumstances not appearing directly applicable to the practice of husbandry, from being unconnected with it; that there are few subjects which are not, in a greater or less degree, related to it. True, there are few persons, who can either observe or advise, in so masterly a manner, as the prince of poets, and the great philosopher and naturalist. But there are few, indeed, who cannot furnish some materials for men of science to work on. I have made these remarks, in excuse for my humble attempts to accumulate facts; as they, from time to time, fall under my notice. Let others usefully apply, or reject them. Natural *phænomena* should be turned to uses, with which the superstition and folly of astrologers and lunologists, have no concern.*

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* *Virgil* was much addicted to the study of *astrology*; and either believed, or affected to have faith in, the fortunate or unlucky days of the *moon's* age. It was the fashion of his day. His advice, to cut *dry grass* and *stubble*, by *moonlight*; was not, however, the effect of this kind of credulity. Two men are now living, who, very many years ago, for several seasons, cut, of choice, my dry meadows by moonlight; in very hot weather. They declared they worked with more ease than in the day; and found the dampness of the grass, with the dews of the night, of great utility. I paid them by the acre; and never had my grounds better mowed.

I might have cited the *Plato* of poets, as *Virgil* was called, on several subjects, which I have had occasion to mention.

The doctrine of changes of crops is as old as the *Georgics*, at least. See *Georgic* lib 1. ver. 82. "Sic quoque mutatis, &c,"—which *Dryden* translates,—

"Thus change of seeds for meagre soils is best,
"And earth manured;—not idle, tho' at rest."

I find too, that I learned at grammar school, *the mode of improving land, by burning*. See ver. 84, & seq.

"Sæpe etiam steriles incendere profuit agros," &c. whereof I give *Dryden's* translation.—

"Long practice has a sure improvement found,
"*With kindled fires to burn the barren ground;*
"When the *light stubble*, to the flames resign'd,
"Is driv'n along and crackles in the wind.
"Whether from hence the hollow womb of earth
"Is warm'd with secret strength for better birth;
"Or when the latent vice is cur'd by fire,
"Redundant humors thro' the pores expire;
"Or that the warmth distends the chinks, and makes
"New breathings, whence new nourishment she takes;
"Or that the heat the gaping ground constrains,
"New knits the surface, and new strings the veins,
"Lest soaking showers should pierce her secret seat,
"Or freezing *Boreas* chill her genial heat;
"Or scorching suns too violently beat."

Some other excellent practices, deemed modern, might be shown to be more than seventeen hundred years old.

Virgil has also anticipated *Linnæus*, in his tests of the characters of seasons; from observations on the *flowering* of *trees*, or *shrubs*. See 1 Georg. v. 187.

"*Contemplator item quum se Nux plurima Silvis*,"—&c.

"Mark well the *flowering almonds* in the wood,—
"If od'rous blooms the bearing-branches load,
"The glebe will answer to the sylvan reign,
"Great heats will follow, and large crops of grain.

Among the BIRDS, whose departure I had observed,

was the species of *Hirundo*,* called the CHIMNEY

* *Hirundo Pelasgia.* See Vol. 5, *Wilson's* Ornithology, page 48, & seq.

" But if a wood of leaves o'ershade the tree,
" Such, and so barren, will the harvest be.
" In vain the hind shall vex the threshing-floor,
" For empty chaff and straw will be thy store." *Dryden.*

Whatever be the fallacy or correctness of such prognostics; they have existed from the earliest times.—Following this, we shall find the practice of *steeping seed-grain*, mentioned;—

" *Semina vidi equidem multos medicare ferentes*," &c.

Also, culling or choosing *the largest grain for seed;* (the best substitute for change,) we perceive to be recommended.

" *Degenerare tamen: ni vis humana quotannis*, &c.

So that, with *Solomon*, one may truly say, " there is no new thing under the sun." We see that *Virgil* was of opinion, that *grain*, (like every other product,) has a tendency to *deteriorate*; " *degenerare.*"

——" *Sic omnia fatis*
" *In pejus ruere, ac retro, sublapsa referri.*"——

I give *Dryden's* translation of what *Virgil* has said, on these subjects.—It would occupy too much room and time to take notice of other topics, treated on in his other books.

" Some *steep their seed*, and some in cauldrons boil,
" With vigorous nitre, and with lees of oil,
" O'er gentle fires; th' exuberant juice to drain,
" And swell the flattering husks with fruitful grain.
" Yet is not the success for years assured,
" Tho' chosen is the seed, and fully cured;
" Unless the peasant, with his annual pain,
" Renews his choice, and *culls the largest grain.*
" Thus all below, whether by nature's curse,
" Or Fate's decree, *degenerate still to worse.*

SWALLOW. They are guiltless of depredations on our valuable products; and are destroyers of flies, and other insects which annoy us. Although their nests, and visitations in our chimneys, are unpleasant; their arrival and departure are thereby the more strongly marked, and more evidently perceived. They abandoned our houses uncommonly early in the last autumn. Soon after their arrival in the spring; when they are in large and countlessly numerous flocks, frequenting hollow trees, chimnies, and caverns; they separate for breeding. So that they are not observed in numerous assemblage, until the chilly nights of autumn arrive. They then, with the reinforcements of their young, produced through the summer, congregate; and again frequent, previously to their departure, their usual places of rendezvous; unless some disturbance to their former place of assemblage had been given: in which case they seek another point of collection for the occasion.* The places of their na-

" So the boat's brawny crew the current stem,
" And, slow advancing, struggle with the stream;—
" But if they slack their hands, or cease to strive,
" Then down the flood, with headlong haste, they drive.

* It would be endless, and probably, by some, not credited, to enumerate many instances of the vast numbers of *chimney swallows*, resorting to one place of rendezvous. I content myself with giving one indubitable account, related by some of the most respectable inhabitants of *Merion*. Mr. *J. Williams* is among the best characters in *Montgomery* county; and lives near the gulf, in *Upper Merion*. The following is an extract of a letter I have

tivity, or resort, they well know; and visit, in vast

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lately received, from an intelligent friend. Dated February 18th, 1814. R. P.

" Agreeably to your request, in company with Mr. H. we called " on Mr. Williams. As nearly as I can recollect, the following is " his story.

" Some time in April last, in the evening, his kitchen chimney, " (the funnel large,) was entirely stopped by *chimney birds*, so that " the smoke would not ascend. The fire was put out, by the soot " and dust that fell. Being an old man, he feared it was something " ominous; and would not have them disturbed. But he, after- " wards, made up his mind, that if they returned, he would oust " them from their quarters. About the middle of May following, " in the evening, coming from his barn, he perceived the atmo- " sphere darkened by those birds. Presently, he saw them *descend-* " *ing into the chimnies* of his *house and out houses*; till they all " disappeared. On going into his kitchen, his housekeeper ex- " claimed! There was nothing but smoke and dust within. He " called to his boy, at the barn, to bring a bundle of straw, and a " long-handled fork. He set the straw in a blaze, and pushed it up " the chimney. Down came the birds. Some without wings; " some without legs. The fire was smothered out; and the floor " covered with the wounded. Their noise was so distressing, that " he was almost induced to leave the house. His intention had been " to scare,—not to maim them. He set his servants to collect both " the dead and wounded. They *counted between two and three* " *thousand*; and then gave it up as an endless job. They measured " about two bushels. His hogs were fond of them; and feasted " on them, for several days." It is to be noted, that these were only the birds, which had made a lodgment in one chimney.

Instances in proof of departure, for hybernation, and return, of birds, might be multiplied without number. The fact of local attachments, either natural or acquired, could also be amply verified.

Martins (Hirundo purpurea) have had red cloth, and wire-rings, sowed and fastened round their legs. Those thus marked, have

flocks, for long courses of years; in like instinctive predilections with BEASTS, who have regular haunts; or FISH, who undeviatingly revisit the rivers in which they were bred; after migrating, in the early stage of their existence at first, and thereafter when full grown, from their native streams, into the vasty and boundless receptacle and nursery of the finny tribes,—the ocean. From this immense region of waters, they return to the places of their usual resort; for breeding, and continuing their species. And this appears to be a propensity common to all animals, in which *instinct* amply supplies the absence of *reason;* and is, to them, the most unerring directrix. Who can now tell what agricultural uses might be made, by intelligent and observing men, of the migrations and return, of *birds*,

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regularly returned after migrations, in the spring seasons of many years; and made use of the boxes, placed for their accommodation, by several persons who have related the facts to me.

This *animus revertendi*, to places of resort, either native, or adopted, and habitually frequented; is not confined to *swallows*.

—— GODFREY Esq. of *Cape May*, winged a *wild goose;* which fell, and was caught. It was fed among his flock of tame geese; and appeared domesticated. The wing, which had been broken, became again perfectly sound. The goose, through several seasons, fled away with the wild flocks, passing over Mr. G's property, towards their distant resorts, for hybernation. It returned, however, every spring; and associated, constantly, with the tame flock. Finally, by clipping its wings, its flight with the wild flock was interrupted and prevented. Its vagrant habit was changed; and it became entirely stationary, and domified.

Other instances, were it necessary to multiply them, could be given; showing that birds, of other kinds, have the like propensities. R. P.

beasts, and *fish*, from and to their native districts of country, places of shelter from temporary inclemencies, or rivers; in the tributary streams whereof, the latter cast their spawn? To these they are directed by natural impulses, which never fail them in pointing to their objects, with more precision and certainty, than astronomical observations, the auxiliary direction of the needle, and all the aids, the deficient, though highly boasted, reason of man, requires. None of the animals guided by instinct, regard the artificial divisions of months, or years. They are regulated by the rigour or mildness of seasons; and are taught by the author of nature, when to appear in, and when to depart from, the places of resort allotted to them. PLANTS in their early stages of advance or decline, are operated upon by similar stimuli, or cautionary care; and vegetation begins and ends, under the like influences of the state of season; without regarding the artificial designations which man has invented, for his guidance. Seasons differing in their temperature so materially, cannot furnish general rules, applicable to every quarter of our globe. It is high time, therefore, that, profiting by the suggestions of the great naturalist, and their evident reasonableness and utility, *we* should make and promulgate observations, from whence the like corollaries may be drawn, for the practical uses of our husbandmen; whose labours must prosper, or fail, according to the state of *our* climate and seasons; and cannot be governed by the rules established in conformity with the climate and seasons, of other divisions of the world.

MIGRATION OF SWALLOWS. A SWALLOW TREE.

If ever the *swallow*, should become a bird, whose appearance in the spring, and departure in the autumn, would mark the seasons, as they regard agricultural operations; the litigated point of HYBERNATION here, would be of some importance. Yet their disappearance in the autumn might be noted, with nearly as much usefulness, even if they actually hybernated with us, and retired from view; as the departure of birds indisputably migratory. This is *vexata questio;* and I do not engage in it, as a controversialist. The *bank swallow*, and *chimney bird*, have been, by the advocates of *hybernation*, the most relied on, for the facts adduced in support of that side of the question; whether they contend for their submersion, or their retirement into holes, trees, or other places, in which they have been alleged to pass away the period of suspended animation. I have, in the course of my life, met with instances of torpid *bank* swallows, taken out of cavities in stone quarries, both in winter and early spring; which leave an impression on me, that, by nature they have a capacity to become *sleepers*, without injury. I have seen them, apparently inanimate, when brought into a warm room,—revive and become agile, and perfectly capable of performing all their functions. I have heard of more than I have seen, of such instances. But I never saw one, which had hybernated in a state of submersion under water. Yet some facts on this point, are confidently alleged.

I had, for a long time, settled the fact, in my own mind, that *some* species of the swallow, actually hybernated here. But, on more mature deliberation, and

attention to circumstances, I have thought myself mistaken; and that the few instances exhibited, were exceptions to the generally credited averment of their migration; and not solid evidence of the general fact; in proof whereof those partial testimonies are produced.

What has been said by that able and much lamented ornithologist—*Wilson*,—has tended to eradicate any remnants of credit, in which I have regarded my former opinion. But I have never ceased to hold myself open to conviction; should undeniable proofs be brought forward.

Through several years past, some members of "*The Blockley and Merion Society of Agriculture and rural Economy*," whose chair I have long had the pleasure to occupy, have related some of the strongest circumstances, in proof of the hybernation of swallows, of the bank and chimney species, I had ever before heard. The country people, in the vicinity of an *aged poplar*, growing on the western bank of the *Schuylkill*, nearly opposite the soap stone quarry, and about a mile from *Crichtbaum's* mill, generally believed, that vast numbers of *chimney birds* wintered in this ancient hollow tree. Season after season, they had, what they deemed, incontrovertible proofs. The birds were seen, in thousands, retiring into a large aperture, forty feet from the ground, in the beginning of winter. And, at the earliest opening of the spring, they made their appearance again. In sunny and warm days, they had been seen, coming out and returning, in great numbers; and retiring finally, as was supposed, into these their winter-quarters. The circumstantial evidence appeared, to

some of our members (intelligent men, and very far removed from credulity, in other matters,) so strong; that, on the arrangement hereafter mentioned being put in progress, bags were carried, for the purpose of bringing off torpid swallows.

In order to satisfy the curiosity of some, and the earnest desire of others, to ascertain the fact,—we appointed a committee, to take every measure the case required. In the first instance, holes had been bored, with a large auger, breast-high. *Foria* (liquid ordure) of birds, as it appeared, mixed with swallow feathers, and rotten-wood-powder, issued from the holes. Encouraged by these appearances, ultimate measures were taken. A day was appointed,—ladders and ropes prepared,—and carpenters engaged to block the tree;—for which purpose a stage was erected. Among other members, I attended; and a concourse of people of the neighbourhood. The ladders were placed so as to enable a person to enter the aperture in the tree, near its forks. He descended, by a rope, through the dark tunnel, till he came within eleven or twelve feet of the surface of the ground. *He lodged on a dry and soft footing;* and the opening into the tree, was cut, at this place, by the carpenters, of size sufficient to permit a man to enter; so that the whole interior of the tree was exposed to examination. The critical moment arrived for development.—Expectation was on tiptoe!—The composition of the *soft*, and somewhat *elastic* collection of matter, which filled the lower cavity of the tree,—was found to be—*not swallows!*—but the deposits of those birds, both feathers and ordure,—mixed with the rotting and rotten remnants of

the heart of the tree. A person went into the tree with a shovel, and threw out, to a considerable depth, the contents; which were intermixed with white worms, or maggots, and feathers of swallows, and of the eagle, and some other birds; probably birds of prey, in quest of their victims. Every mark of swallows having frequented the tree, in great numbers, was evident. But not a bird,—dead or alive,—was seen. The day of examination was the 16th of the present month;—sufficiently late in the season: and we were favoured with fine weather, for our *reconnoissance*. The opening we had made was closed; to prevent the birds from abandoning their wonted asylum, on their return, next season. So that this long credited testimony of *hybernation*, entirely failed.

If I have been too minute, I have been operated on by a desire to show, that every necessary measure was taken, to ascertain the truth, or fallacy, of a firm belief, which had been entertained for more than forty years, that this tree would furnish an irrefragable proof, in support of the doctrine of hybernation here, of this species of the swallow.

The tree must be five or six feet in diameter; and is in tolerable vigour. The thickness of the *alburnum*, or sapwood, (for there is little else,) does not exceed six or seven inches. Yet it proves the doctrine mentioned by DARWIN, that the life of the tree is in the sapwood; and the heart, being only a deposit from it, has little to do with its vigour, or growth. We saw here, that the heart was almost entirely gone. The interior was clear of all obstruction, up to the forks of the tree; and was nicely *polished* by the wings of the

birds, in their downward and upward flights; whilst this place of retirement from chilly nights, or untimely inclemencies of the spring, or autumn, afforded, to the myriads who resorted thither, a comfortable shelter; when they had collected, on their arrival from their winter quarters; and before dispersion to breed; and for more easy subsistence. Or, after their summer, and during their autumnal abidance, they had reassembled, for departure, to seek more temperate regions; having arrived, in some years earlier, and departed in others, later, on their distant flights, to and from milder latitudes. If one were to form a comparative estimate, between the smaller birds, and the WILD PIGEON, which flies sixty or eighty miles to its feeding place; and returns to its nest or roost, between sun rise and ten o'clock in the same morning; (see *Wilson*, vol. 5,) we might conclude, that migratory birds may linger with safety, before they set out on their aërial voyages. They can soon arrive at their places of destination. They breathe, in proportion to size, the greatest quantity of air, and are endowed with superior muscular strength, beyond any other animal.*

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* Some birds of passage hybernate with us, and leave us in the spring. One of these kinds is the SHORT-EARED OWL, described by *Wilson*, in his 4th volume.

The numbers of *mice*, *moles*, and other vermin, destroyed by the *Strix brachyotos*, or *short-eared owl*, are truly suprising. All the owl tribe are mousers. A pine tree, spreading and thick set, near my house, affords a shelter and roost to about a dozen of these owls, through the winters. The quantities of fur, teeth, and mashed bones, of a variety of diminutive animals,—such as mice, moles, small squirrels, and probably also young rats,—contained in the or-

MIGRATION, AND RETURN OF FISH.

Whilst we were attending the operations necessary to the accomplishment of our object of exploring the supposed retreat of the swallows, the subject of migrations of various animals, was discussed. The elder Mr. *Hagy*, an intelligent, and highly respectable resident, near the mouth of Mill creek, in *Merion*, reminded me of a fact well ascertained to me, respecting the SCHUYLKILL SHAD. Twenty five or six years ago, it was brought forward in our legislature, when a bill was before them, relating to dams and obstructions in navigable waters, and streams frequented by fish; to the breed

dure of those useful and keen hunters, (among which, not a feather is to be seen,) most plenteously dropped under the tree, show the industry, and astonishing powers of digestion, of these birds. A few of them, (and they generally are gregarious,) will soon clear the barns and outhouses of a farm; and thin the vermin of fields in the vicinity of their head quarters. Farmers should encourage them to resort to roosts near their buildings; and invite their visits in every way. I believe this species of the owl, guiltless of depredations on poultry.

I had observed, during several summers, the extraordinary growth of *green grass*,* under the pine tree frequented by the owls; but did not, until lately, perceive the cause. The ejections from them create a most uncommon fertility. They arrive in *Pennsylvania*, in November; and leave us in April. They always return to the places from whence they migrated, unless disturbed and forced from them, by untoward circumstances. The services they render, by exterminating the pernicious vermin, which so ruinously infest us; fully compensate for the unmusical tones, by which their notes are distinguished. R. P.

* Poa viridis.

whereof, such obstructions are fatal. I could then have proved it by many witnesses; and can now verify one similar, by referring to Mr. *Hagy;* than whom there can be no better authority. Sundry fishermen on the *Schuylkill*, in the months of August and September, when the young shad were descending the river, on their way to the sea, marked, I believe, about one hundred, in various modes. Some had slight scores, in the fleshy parts; and others had parts of their tails and fins cut off. In the ensuing fishing season of the next year, upwards of THIRTY of these fish, full grown, were caught, at the fisheries, (mine included) above and below the great falls. Other marked fish, undoubtedly, passed up the stream. I have heard of more recent proofs; but have no personal knowledge of them.

Thirty years ago, Mr. *Hagy* was acquainted with similar facts. A considerable number of young SHAD were marked, in various ways; and above THIRTY of them were caught at one now his own, and other fisheries in his vicinity, during the ensuing season. Probably, others were taken, at more distant fisheries, and the marks unnoticed. There can be no more incontrovertible proofs, that FISH, constantly and exclusively, *return to the rivers in which they are bred.** *Connecticut river*, formerly famous for the greatest plenty of SALMON, having been obstructed, in many places, by dams, has not now, (as I have heard,) in any parts of its waters, one of that most valuable species of FISH. If they cannot arrive at their breeding places, they linger in the lower waters, for a season or two; but they

* See Note, page 353.

finally abandon the river; and are there no more seen. This remark not only applies to the *salmon;* but to every species of fish.

I have mentioned the foregoing facts, merely as incidents in natural history. They show, that the law-definition of *feræ naturæ*, whose characteristical properties are, by lawyers, said to be, that they are erratic, and do not possess the *animus revertendi*, is not correct. *Beasts* have the like propensities to seek their native homes, with *fish*, or *birds*. But all of them will change their haunts, or places of breeding and resort; when uncommon circumstances occur.

Neither have I, here, any view to plans for damming rivers, for carrying on internal navigation. If the fish, in streams devoted to such purposes, are less valuable than the object aimed at; it is said to be an affair of calculation, (however much their destruction is to be lamented,) for those interested; and an object of compensation to the sufferers. At least, it is thought so, by those who sacrifice the bountiful gifts of nature, to gainful pursuits. Public benefits, may overbalance private considerations. But the advantages, in this respect, ought to be extensive, and evident; and their accomplishment should be certain. Otherwise the fish of a whole river may be destroyed; and the *professed* public benefits never attained. CANALS leave the fisheries uninjured; and afford the safest and surest navigation. The BEDS OF RIVERS, subject to floods and their consequences, are generally avoided by European hydraulic engineers. The famous BRINLEY, in his examination before the house of commons, in *England*, having spoken slightly of river navigation, was

asked "*what then were rivers designed for?*" He answered—"*to feed canals:*"—or words to this effect. Although this anecdote is well known, it is regarded with less consideration than it deserves. The quaintness of the reply, may not please those who are overnice in such matters; but the strong sense of preference he gives to *canals*, over *beds of rivers*, is decisively shown. Than this self taught, but (in this branch, and in his day,) peerless hydraulic engineer, *Europe* has not produced one superior, in the fundamental principles and practical knowledge of the art, whereof he has exhibited the most convincing and stupendous proofs.

RICHARD PETERS.

December 20th, 1813.

To the Philad. Agric. Soc.

NOTE.

Mr. *Hagy*, and other of my friends, who furnished, and certified, the following proofs of the facts relating to the *Schuylkill shad*, are among the principal and highly respectable inhabitants of Montgomery county. The proofs might have been multiplied, had it been required. R. P.

About thirty years ago, John Roberts, Cooper, and myself, (in the fall season,) marked a considerable number of young shad, then from four to five inches long, by cutting off a part of the upper fin, or fork, of their tails; in order, if possible, to ascertain whether they returned to the *Schuylkill*, in the following year. I was informed by Philip Shubert, and Jacob and John Colp, that they had caught, the ensuing spring, many full grown fish, marked as aforesaid.

Signed by order or request of my father, WILLIAM WARD.
Per H. R. WARD.

Lower Merion, 10*th March*, 1814.

Having been told by William Ward, that himself and John Roberts, cooper, had marked a number of small shad, the preceding fall season, in their passage down *Schuylkill*, for the purpose of knowing whether they returned to the same waters; the following spring, I observed one fish; and found the marks mentioned by said Ward, viz. a piece cut off the upper tail fin, or fork. We caught on the same day, at Port Royal, *seven* fish, bearing the same mark, of full growth and size. There were two or three hundred fish taken and sold on the same day, and among them there might have been more of the same mark. What induced the search was, that Joseph Johnson, one of the fishermen, took up a large shad, and observed,—" here is one of William Ward's mark!"*—I was informed that at Peewee, the same season, *seventeen* of the same mark were caught. At an island, *nine*, and at another island called the Welch island, *eleven*. The four fisheries are all within a mile of each other. The shad were marked at the last mentioned fishery.

JACOB COLP.

Roxborough, Philadelphia County,
March 10, 1814.

We, the subscribers, have been long acquainted with William Ward and Jacob Colp, and know them to be persons of veracity, deserving full credit.

WILLIAM HAGY,
JOSEPH PRICE,
JOHN BUSH,
JONATHAN JONES.

Montgomery County, March 10, 1814.

* This shad is said to have weighed above eight pounds. At the place where the fin had been cut, there grew a lump, or gristle, about the size of a pea. This appeared in every marked fish. R. P.

Estimate of the probable Profit in keeping one thousand Sheep, by Dr. Robert H. Rose, of Luzerne County, Pennsylvania.

Read February 8, 1814.

We cheerfully insert the following information, respecting the capabilities of our new countries to raise and keep large flocks of sheep. It was not intended for publication; but it has been deemed worthy a place in our memoirs.

The regret we feel under the deficiency of information upon the popular subject of SHEEP, is great indeed. We should have been gratified by receiving, and promulgating, statements founded in experience. Such might have been furnished; practice having enabled many of our fellow citizens to afford facts, on a topic of such general concern. Those facts would encourage the timid; or check the over ardent zeal of the miscalculating and unwary. The following is more conjectural than practical; but it results from inquiries made by one of our very intelligent members, aided by other men of respectability; whose opinions we highly value. Although it appears to be local, as to the scene in which the data are placed; yet it will equally well apply to all our new countries, under the like circumstances with *Susquehanna* county; as most of them are. It will, at least, furnish hints, of no small importance to those who would wish to give value to their newly settled, or settling property; by encouraging its occupants to enter into the sheep business, on a suitable scale; especially in situations wherein *grazing* is preferred to *tillage*.

The following calculation, respecting the cost of keeping one thousand sheep, in Susquehanna county, is made by Captain Birchard, Z. Bliss, and P. Catlin, Esq. whom I consider as among the most prudent and judicious men in our county.

Captain Birchard thought two hundred acres of cleared land would be a large allowance for meadow and pasture. The other two gentlemen thought one hundred and sixty six acres a sufficiency; sixty-six in meadow, and the rest in pasture. The part reserved for meadow to be pastured after harvest. They all calculated the produce of the reserved part, to be a ton and a half of hay per acre. It should be observed, that we have no watered meadows in Susquehanna county, and the above quantity of hay they considered as being yielded by sixty-six acres, well selected, and which the sheep should be prevented from pasturing on in the spring.

The questions were asked of each one alone, so that no one knew the sentiments of the others, on the subject, till after he had given his own.

	Capt. Birchard.	*Z. Bliss.*	*P. Catlin.*
Expense of making the hay,	$ 150	$ 200	$ 200
do. for salt,	40	16	8
do. corn, potatoes, &c.	20	75	75
do. attendants,	400	400	585
do. washing & shearing	40	60	50
	$ 650	$ 751	$ 918

Captain Birchard and 'squire Bliss calculated on one man and two boys being sufficient to attend the flock. Mr. Catlin calculated on two men and two boys. On being informed of the number of attendants, allowed to the flock by the other gentlemen, he said he thought he had overrated the labour, and was inclined to believe that they were right. He estimated the labour of each man, together with his maintenance, at $ 195.

This sum, deducted from his total, would leave the estimates thus: Captain Birchard, $ 650, Z. Bliss, $ 751, P. Catlin, $ 723.

Their estimates of the wool, and increase of the flock, were exactly the same, viz.

An increase of 500 per annum, (after making up all losses,) at $ 2,	$ 1000
Three pounds of wool per fleece at 50 cents,	1500
	2500
From this deduct the greatest estimated expense,	918
Annual profit,	$ 1582

It was understood that the flock should have the common proportion of wethers in it.

These calculations are made on the common sheep; the profit would of course be greater on the improved breeds. All these gentlemen concur in opinion, that the increase of sheep is much greater here than in Connecticut, (from whence they came,) a much greater proportion of the ewes having twins; and that in weight of fleece and carcass, the sheep of Susquehanna county exceed those of Connecticut by at least one third. Mr. Catlin's flock is about one hundred and fifty, amongst which are several full blooded Merinos. They think the settlers on any tract, could easily, in addition to their present stock of cattle, keep twenty sheep each, on an average, which for three hundred settlers, would be 6000, and yield 18000 pounds of wool. In three years from this time, if a woollen manufactory were established at the lake, they think the settlers would

have double that number. At present they may have about 3000 sheep in the settlement: though I believe hardly so many.

It is common to let out sheep here, and the usual mode is, for the person who takes them, to return double the number, or value, in three years—he keeping the surplus, and the wool. Another mode of letting out sheep is, at a pound of wool, annually, a head, the person taking them being responsible for their safety. The latter, it is supposed, would be generally preferred by the settlers, and that from one to two thousand sheep might be distributed among them next summer.

It is supposed that it takes six years to change a flock of common sheep into Merinos.

Price of 1000 common ewes, -		$ 2000
Value of 1000 Merinos, at the end of six years, estimated at $ 20, - -		20000
Difference of value in six years, -		$ 18000

The annual increase has been estimated at 500, and these valued at $ 1000. But this amount would be gradually increased by the conversion of the common sheep into Merinos, on the first year they would be half bloods,—second year, three quarter bloods, &c. Take therefore some medium value for the progeny, say ten dollars a head. On 500 this would be $ 5000. The difference per annum would therefore be $ 4000, which in six years is $ 24000. Add this to the above difference in value of the flock in six years, (18000) and it gives an increased profit in that time of $ 42000. Besides which, the profit on the wool would also be gradually increased, as it improves in fineness or quantity. To effect the above change, a certain number of Merino rams would be necessary in the commencement.

It is calculated with us, that

Clearing and fencing cost per acre, -		$ 12 00
One bushel of wheat sowed per acre,		1 50
Harrowing, (we don't plough,) - -		3 00
Harvesting, - - - -		2 00
Threshing, - - - - - -		3 75
Total,		22 25
The first cost may be fairly estimated at 20 bushels of wheat per acre, which at $ 1 50 the price it commonly sells for, between spring and harvest, is - - -		30 00
Which leaves a profit, (besides paying the above expenses) of, per acre, - -		$ 7 75

From which it appears, that the cleared land necessary to support a thousand sheep, could scarcely be considered as adding to the expense of their support. I think the foregoing calculation moderate. I have asked some of the best farmers among my settlers, the amount of their crops the present season. John Swan, Isaac Hiscock, and Abel Pearce, say they had 25 bushels of wheat per acre. William Ladd had 33 bushels of rye. Lark Moore had 33 bushels of wheat.

Swan, Hiscock and Pearce's crops, 25 bushels, at $ 1 50, would be, - - -	$ 37 50
Deduct for clearing, &c.	22 25
Profit per acre,	$ 15 25

William Ladd's crop of rye, 33 bushels, at $ 1	33 00
Deduct for cleaning, &c.	22 25
Profit per acre,	$ 10 75

Lark Moore's crop, 33 bushels of wheat at $ 1 50, - - -	49 50
Deduct for clearing, &c.	22 25
Profit per acre,	$ 27 25

If you take the lowest estimate of these, the profit of clearing 1000 acres would be,	$ 10750
Which would pay for the land at - -	3000
And leave a balance, (sufficient to put up the necessary buildings,) of - - -	$ 7750

To keep 5000 sheep in this country, would require about one thousand acres of cleared land. This, near Philadelphia or Wilmington, of a good quality, probably could not be got for less than forty or fifty dollars per acre.* I presume the farms there have at least one fifth part of wood land attached to them. This would make 1250 acres, and at forty dollars per acre, would cost $ 50000, the third part of which sum would in this country, procure the land, sheep, and set a small manufactory in operation. I believe that very few of the farms near Philadelphia or Wilmington, are equal to our lands for grazing.

* Dr. R. might now double his estimate, in this item.

All the above calculations tend to prove the advantages of raising sheep in this county. Even one half of the estimated profits on the items, would be very great. If sheep can be raised to profit in places where the land sells from fifty to one hundred dollars per acre, surely the business might be very successfully carried on here. I know of no upland country, where the timber is principally oak and chesnut, as it is in Delaware, and the lower part of this state, where the common fields, that are well seeded, if kept from grazing, will turn out from one to two tons of hay per acre, as ours will, and this without manure or irrigation. Our timber is principally beech, sugar maple, hemlock, ash, birch, basswood, elm, chesnut, cherry, and white pine, and the soil a deep loam. The only grasses raised in the county, are clover and timothy.

To the foregoing calculations of profit might be added the increased value of the land employed, after it was well laid down to grass, especially if a manufactory were erected in the vicinity; and as the lands here are rising rapidly in value.

Four years ago, I sold my land from one dollar and an half, to two dollars per acre. I now sell from three to four dollars per acre, according to situation, giving three years without interest. This is lower than any other lands in the county. Were my lands in the state of New York, and equally situated, as it respects market, &c. they would sell for from seven to ten dollars per acre.* They are rising fast in value. I sell to

* This is a mortifying reflection, for *Pennsylvania* landholders. It shows a superior management in the policy of our sister state.

none but actual settlers, and in lots from one to two hundred acres, generally.

Facilities to transportation, by roads and inland navigation, (with some natural advantages,) are the magical powers. Although our state lingered too long, before public assistance and patronage were afforded to those great public improvements, it is encouraging to perceive the important advances, now in progress, to remedy the oversight. But much remains to be done. R. P.

Common Sheep; coarse, long, and combing Wool.

Read February 8, 1814.

Some members of our society are apprehensive, that calling the attention of farmers to coarser wools, would tend to damp the laudable endeavours now making, to increase the numbers of sheep with fine fleeces. No such intention exists in my mind. But common sheep want an advocate; whilst, with laudable prejudices in their favour, those of fine fleeces recommend themselves. I am as desirous as any one can be, to forward every measure for propagating the breeds of fine woolled sheep. I consider the addition of the *Spanish sheep*, which the troubles of the oppressed country from whence they came, have occasioned our acquiring, to be a blessing most important to the interests, all of us should cherish. But flocks for *every purpose*, are essential; and must be encouraged. There is room enough for every variety; and no incompatibility in their being objects of profitable attention, in different quarters of our extensive country. See 2d vol. 214-15, 241, &c.

In the *English* prints,* it will be seen; that apprehensions are

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* Extract from an English print.

London, December 23d, 1813.

"An enormous advance has taken place on *carpeting, blankets, druggets, coarse cloths;* and most kinds of woollen goods. In the rage for encouraging the fine breeds of sheep, the agriculturists seem to have forgotten, that the

now entertained, in Great Britain, of a scarcity of wools for the coarser fabricks; owing to the more general attention to sheep of fine fleeces. The neglect of the common breeds, is already severely felt.

The wools of common sheep in this country, I have long believed, are finer than those of the like species in *Europe*. Our climate has a favourable influence on the filament of wool. But the combing and coarser wools, for articles most generally required, are as indispensable, as are the men composing the great mass of our population, who daily stand in need of them. Whilst men of refined taste and manners, and superior endowments, are the ornaments of society; the labouring classes are the strength and bulwarks of every country. Their accommodation, within their capacity to obtain, at reasonable rates, the articles they cannot dispense with, should always be objects of peculiar attention. The fabricks produced from common fleeces, and coarser wools, are among these objects; and are, indeed, essential to the comforts of every member of our community, whatever may be his wealth, his acquirements, or his condition. In vain shall we look to foreign nations, to supply deficiencies in our own country; if the coarser wools are also scarce among *them*. Were it, from inevitable necessity, to be decided by a general vote, whether fine fleeced, or common, coarse, and long woolled sheep, should be stricken out of existence; the wants of mankind would compel the suffrage in favour of the latter.

The calculations of those who pursue exclusively, the fine-wool system, are,—"How much money can be made, by fine and high priced fleeces and fabricks?" "Make money, (a most desirable object, no doubt,) and you can buy all things."—Nevertheless, without plenty of long and coarse, or common and appropriate wools, *money* will not buy a competent supply of *good* blankets.*

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grand staple manufactures of this country are produced from the long wools of the old native growth; which are now scarcely to be obtained, at double their former prices; while the demand for the finer sorts, is, comparatively trifling."

* My duty, during the war of the revolution, called my attention to the clothing of our troops. Multitudes became disabled, and great numbers pe-

The value of this article consists in its weight, as well as in its manufacture; in which latter, American workmen are lamentably deficient. Wools are so much applied to other purposes, that our workmen have not had the necessary practice, to teach them perfection. Render scarce by neglect, or annihilate, the materials whereof it is made; and the golden dreams, as to the capacity of *money* to buy even this article, so common and so necessary, both to the rich and the poor,—vanish at once.

The true question, as it concerns the general welfare, is;—"What material will produce the greatest abundance of fabricks, essential to the health and comforts of the greatest number of our fellow-men?" This material will be demanded by the most people; and therefore, in the end, yield the most money, in the aggregate. Should this be, finally, the result; though it may now be otherwise,—our patriotism will be stimulated by our cupidity.—We should not calculate merely on *fleece*.—Farmers have different views, from those of flock-masters. The former pursue *Culley*'s opinion; which, to farmers (who do not keep sheep for the fleece alone,) will be found, *generally*, correct; though temporary circumstances may form exceptions.—"That breed is the best, that brings the most profit in fleece and carcass together, from the same ground." *Culley* on live stock, 153. He has judiciously added,—"in equal times."—For valuable fleeces induce the procrastinating the slaughtering sheep bearing them, 'till the carcasses are of little value; and, at any rate, prevent plentiful supplies of them.

Should such as have been *grazing* and *dairy* farms, be now devoted to *sheep*, beyond a due proportion, it will (as already begins to be apprehended,) tend to decrease the numbers of *cattle*, of all descriptions; and, of course, diminish the quantities of beef, veal, butter, and milk, in our markets. *Mutton*, is not, generally, relished by *our* labouring people. Should necessity force it on them, as a substitute for beef, the flocks affording the greatest plenty of mutton, and the most inviting carcasses, will be the most in demand; be the breed producing them what it may. I enter into no discussions on this subject. In the *English* prints, I perceive very warm, and even acrimonious controversies, on this point; on which, after all, the *experience* of sheep-breeders, and the taste or fancy of consumers, must decide.

I have been long of opinion, that an immense and certain supply of wool, either for home manufacture, or exportation, could be most surely obtained, by a distribution of sheep, in small flocks, of the various and best breeds, among the farmers of our old settlements.—The more of those bearing fleeces the most in demand for *general* purposes, and of the best carcasses for mutton,—the better. They might be, however, calculated either for wool or mutton. But a good fleeced sheep, (though the wool be not of the finest filament,) with a saleable and superior carcass, will be most eligible for the great body of husbandmen. Each farmer would keep more carefully, and in the best order, the numbers his other agricultural employments would permit; and, on *this* plan *that* number, should not be exceeded. Large flocks may be established by capitalists. *They* would find their account in extensive establishments, conducted as a business, separate from the common and more confined operations in husbandry. In our new countries, wherein ready markets for common products are not attainable, sheep establishments may be made highly advantageous. But *factories* must be combined with them. These would not only be profitable in themselves, but they would create markets, both for the wool and the mutton, as well as other produce of farms. Dr. *Rose* seems to be sensible of this; and has connected factories of cloth with his plan of raising sheep, and improving their breeds. But he will have, also, to procure the best breed of SHEPHERD'S DOGS;* which are essential, as guards against

rished, for want of *blankets*, which we *could not* supply. Painful recollections have induced me to notice this article, emphatically. Very many others might be mentioned. R. P.

* See Appendix. I think the *wild beasts* of the forest, are not more dangerous to sheep, than are the *dogs* of our settled country. A true sheep-killing dog attacks the sheep, exactly in the mode in which a wolf destroys them. They both seize the neck and throat and gorge themselves with the blood. See 2d vol. 247 and 317. The following, I extract from a newspaper. It is well worthy attention and preservation. The quarter from whence it comes, induces a belief in its efficacy. The neck and throat being the points aimed at, if repellents are placed there, it seems the destroyer avoids them. It would, however, be advisable not to trust entirely to

wolves, and other beasts of prey, in our new countries. In our old settlements they are as necessary to protect flocks from other

this method. Sheep have been preserved from destruction by *dogs* by *collars* filled with sharp pointed *nails*. No doubt the same guard against *wolves*, would be equally effectual.*

Many *smells* are disgusting to animals. It is a jockey's trick,—calculated to throw the work on a dull horse,—or one not his own,—coupled with another horse, to rub *assafœtida*, *aloes*, or some forbidding drug, on the horse he wishes to spare. The other horse presses forward, with ceaseless exertion, to leave the nauseating scent behind him. The *dog* and the *wolf* may have an antipathy to the smell, and taste, of the loathsome ointment hereafter described. Should the unguents required to cure the cutaneous diseases of the *Merinoes*, shield them from *dogs* and *wolves*; no small good would flow from a most deplorable evil.

I believe the horse has an antipathy to *assafœtida*. This is otherwise with other animals. Possibly those which even like the smell when slight, are disgusted, when it is heavy and powerful. This may be the case, with the horse. *Wolves* are enticed by a trail, or bait, tinged with *assafœtida*. *Rats*, and *mice*, are fond of this drug, or that of *musk*; though they prefer the odour of the *oil of rhodium*, to any other. I have heretofore mentioned, that *white-wash* embued with oil of vitriol, is a repellent to flies, which will not settle on a wall covered with this mixture. The *sulphuric acid* also banishes *bugs* from bedsteads.

It would be greatly beneficial to farmers, gardeners, and all who are subject to be visited by destructive vermin, if the nature and qualities of any substances, drugs, plants, flowers, &c. likely to be thus useful, were studied; with the view to discover their repelling, as well as inviting faculties. *Elder flowers*, we know, drive off some insects; *mint*, others. *Pennyroyal* will expel *fleas*, from beds, or apartments infested by them; and may be used either in substance, infusion, or decoction, for banishing this vile pest, from *dogs*, *swine*, or other animals. *Hound's-tongue*, is detested by *mice* and *moles*. The smell of dead *crabs* and *lobsters*, is also disgusting to them. It will also expel, from a granary, the *weevil*. *Tobacco* is so inviting to *weevil*, that there is no surer way of completely destroying them, than placing *refuse tobacco*, in granaries. The weevil eat, greedily, of the tobacco, and die. I could enumerate other instances; but those I have mentioned, are sufficient to shew the uses to which the subject may be applied.

* SHEEP.

"A simple and effectual method of preventing the destruction of sheep by "wolves.—Communicated to the Society for the promotion of Useful Arts in

dogs, equally dangerous with the wild beasts of our forests. The sheep-killing dogs are more difficult to destroy; because many of their owners are scarcely ever sufficiently sensible of their enormities; and seldom liberal enough to permit, without resentment, or opposition, their destruction. So far are just sentiments from being generally entertained on this subject; that some owners of common dogs, have indulged their vindictive passions to the injury of flock-masters; whose faithful guardians have, in defence of their charge, wounded or killed other dogs, lying in wait, or actually found, under the most suspicious circumstances, among flocks.

It is idle to keep inferior sheep; which are equally expensive with the best breeds, and yield the smallest profit. In the selections of breeds we should, however, be regulated by a sound discretion and attention to circumstances. Varieties and plenty of

"the state of New-York, by Ezra L'Hommedieu, vice president of the soci-"ety.

"Mr. Walter Briggs, a respectable farmer in Scoharie, who keeps a large "number of sheep, informs me that he loses none of them by wolves, which "are plenty in that part of the country, and cannot be driven off or destroy-"ed except by traps.—He makes an ointment, composed of gunpowder and "brimstone, powdered fine and mixed with tar and gurry, or currier's oil. "With this he anoints the under part of the throat of the sheep. It must be "renewed as often as the ointment becomes dry, or loses its moisture, which "will be four or five times in a season.—He says he has lost no sheep since he "has been in this practice, and has often seen the wolves' tracks among the "sheeps' tracks in the fields. He had a parcel of sheep which had been out "a number of weeks, and no care taken of them, except their necks being "anointed with this ointment, when he was informed by his neighbor that the "sheep were at his house, and that early on Sunday morning they came "running into his door-yard—he looked out of the window, and saw a wolf "among them, who ran from one sheep to another, and jumped upon them, "but did not offer to bite any of them. The sheep were brought home, and "none of them injured by the wolf.

"I thought it advisable to make this communication to the society, as "many parts of our country are so infested by wolves, that they are obliged "to yard their sheep every night, to prevent their being destroyed by those "voracious animals."

clothing are as essential to the demands, support, and comfort, of man, as varieties and plenty of food. Fine wool is only suitable for certain fabrics, which are within the pecuniary ability of the less portion of the community. Yet fine wool should be an object of great consideration; and every encouragement should be given to breeds producing it. But *all* classes of our people, whether rich or poor, require, in whole or in part, the fabrics which fine wool will not make. Even the *Merino*, when mixed with the better kinds of common wool, works more advantageously; both for the manufacturer and the fabric.

Let any one inquire of those who have had, and of those who now have, the providing of supplies of clothing, blankets, &c. for our troops, (if he be not satisfied with his own experience,) relative to the fact of scarcity of coarse wool, and the fabrics composed of it. He will find, that those articles are difficult to be obtained; beyond all comparison with those made from fine wool. A large contract for coarse woollens, for the army, was offered to the proprietor of an extensive manufacturing establishment. It was refused; not only on account of the greater profit on fine cloths; but because the raw material for the coarse goods, could not be profitably or easily obtained. The scarcity of animal wool, has forced the incompetent substitute of *cotton*; wheresoever it can, in any tolerable degree, answer the purposes required.

I am aware that no inconsiderable portion of wool is withheld, from the market, by HOUSEHOLD MANUFACTURES;—a most commendable mode of employing it. But it does not follow, that all this is *coarse* wool. On the contrary, we know, that country people have a laudable pride in devoting their finest and best fleeces to their own use. Household manufactures may have increased, (owing to the present state of things,) beyond their usual standard. If so, it is a most desirable and fortunate event. Such manufactures deduct no labour from agriculture; nor are they subject to the objections, vicissitudes, and expense, attendant on large manufacturing establishments. Nevertheless it must be apparent, that articles requiring the coarser wools, either for household or other manufactures, will continue to be more and more scarce, in proportion to the increase of fine woolled sheep; which naturally leads to the neglect of other breeds.

I do not presume to direct public opinion; or regulate private propensities. But, at the same time, I do not hesitate to declare, that a spirit should be roused and encouraged, for breeding the long woolled and heavy fleeced sheep, calculated for worsteds, blankets, and all the coarser fabricks. Such sheep, or some of them, would thrive in our new countries; and in parts of older settlements, where coarser grasses, and more moist grounds, render the pastures less fit for fine woolled sheep; both as they respect quality of esculent and insalubrity, or other forbidding circumstances attending the position. But sheep of all breeds thrive most in wholesome, dry, and high situations. The *rot* is the malady of sheep fed on wet pastures. It is, however, little known in this country.

The world has been long in a state so precarious and unnatural, that persons of more penetration than I pretend to, may be egregiously mistaken in their anticipations, concerning the affairs of our own, or other countries. But, it would seem, that, if *peace* should return, within a short time, our manufactories will be the most in demand, for furnishing the coarser fabricks; because they are the most generally in requisition; and are not so injuriously subject to European competition.* If the necessary materials for

* Some who have embarked extensively in manufactures, may probably have more correct views of the subject; and think that we can, with the most certain prospects of success, compete in *fine* woollen goods.—At any rate, the necessity and demand for them will be limited.

What will be the state of our manufactures, when PEACE is durably established, and commerce resumes its wonted course, I do not pretend to foresee. Those of cotton seem to bid fairest, for most permanent success. Our commerce, and all the manufactures, arts, and occupations, dependent upon, or auxiliary to it, have been suffered to linger, or perish. It is, then, not confidently to be expected, that those growing out of the ruins of external trade will be more favourably treated, after the occasion which brought them into existence has passed away. It will be deemed too great a stretch of patriotism in consumers, to pay more for domestic than for foreign goods, even if of equal quality. High protecting duties will be found to promote fraud and perjury; and to starve the treasury. Local jealousies will forbid

fabricks composed of long and coarser wool, and those made from the wool of heavy fleeced sheep, should, as they now are, and will be, wanting, when they are indispensibly required; we shall still remain under dependence on foreign countries, for a great proportion of the woollens, most generally in use.

I should be the last, to encourage speculative, or speculating pursuits. But appearances strongly favour the idea, that plans for raising fine woolled sheep exclusively, are the most zealously and extensively adopted. This propensity, to a certain point, possibly not yet reached, is highly worthy of praise. But, it assuredly, throws into the back ground, the breeds of other descriptions. Of course, their numbers decrease; while the demand for them continues undiminished. I should therefore presume, that those who would calculate their breeds of sheep, (well selected, both as to stock and local circumstances,) for the coarser woollens for clothing, and all other articles of accommodation, composed of animal wool; and to which fine fleeces cannot be applied; would secure to themselves solid and certain advantages, and greatly benefit their country; either on the happy and most desirable return of peace, or the continuance of our hostile position.

I do not mean, here, to designate any breed, particularly. If I had so intended, I should not have omitted the *Tunis* broad tailed sheep, which still holds its valuable character, in my estimation;

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sacrifices by one section of the union in which manufactories of woollen goods are not numerous, to encourage those established extensively in another division of our country; more especially when no direct equivalent benefit is derived from such encouragement. Every manufacture must therefore depend, for its success and durability, on its own merits. Whether the manufactures whereof fine wools are the materials, be or not capable of resisting competition, and finally securing, by their own excellence, the success essential to their durability; experience only can decide. Large *capitalists* are the most concerned in such questions, and can resist, with the most likelihood of success, the shock of sudden vicissitudes.—Prudent *farmers* should, individually, embark so moderate a proportion of their means, in objects thus subject to the vacillations of public circumstances, as not to risk being ruinously affected, in whatever way the subject may finally settle down. R. P.

and is capable of thriving, in every situation. It would be presumption in me to point out any particular breeds.—Local circumstances,—such as damp or dry pastures,—mountainous or flat country,—short and fine,—or long and coarse, bites,—heathy and barren browsing,—and numberless other circumstances, must govern the selection; and experience only can decide on the success. Large sheep, of any breed, are the least profitable. I have in our 2d vol. page 219, fully expressed an opinion on this subject.

Some have said,—"Encourage the growth of fine wools; and there will be a sufficiency of common wool, in the sorting, cullings, and offals of fine fleeces." But this is, for the most part, an erroneous opinion. As much care and judgment are necessary, in growing wools appropriate to the various coarser fabricks; as can be required in the growth of the finest fleeces. True, offals, cullings, and ordinary parts, may be *mixed*, in many coarse articles. But in most of those peculiarly necessary and valuable; the wool, in the great body of it, must be exactly suitable to the fabrick. The wool of fleeces may, and must be, sorted by intelligent *staplers*, so as to suit different fabricks. But no sorting can, profitably, substitute short wool, where long is required; nor *vice versa*. The long or short, and the fine or coarse, filament, depend entirely on the breed of the animal, and the keep. Intelligence, and care, in the farmer or flock master, are the predominant essentials, indispensibly required to ensure the value and welfare of the flock.* R. PETERS.

January, 1814.

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* See our 2d vol. 215, 221.

☞ In our selections will be seen excellent directions, extracted from EVANS & RUFFY'S *Farmers' Journal*. *London*, Sept. 20th, 1813; for the KEEPING, WASHING, SHEARING, and MARKING of sheep and lambs. Taken from an official document; signed by Mr. *Dix*, secretary to the FARMING SOCIETY OF IRELAND.

Account of Montagne, a shepherd's dog, by Mr. P. Bauduy, of Delaware.

Read February, 1814.

Dear Sir,

I received your letter of the 27th inst. it was the first knowledge I had of the information you requested, respecting the dogs imported from Spain. I think that too much cannot be said, to encourage their propagation throughout the United States. Therefore I recommend the subject to your able pen.

We have heretofore laboured under very great disadvantages with regard to our flocks; I am at a loss to know, whether the destruction of sheep by dogs in this country does not exceed that by wolves in Europe. The imported dog from Spain is a very great security to our flocks.

I will not undertake to determine from what breed he springs. Buffon thinks that the shepherd dog is the root of all the canine race. The dog you enquire after is three times as large as the shepherd's dog described by Buffon; but is endowed with the same good qualities; immense strength, great mildness in his usual deportment, though ferocious towards other dogs. I can say, without exaggeration, that at least 20 dogs have been killed in my barn-yard or on my farm by him; but this good quality is like all things in this world attended with an evil; for I find that Montagne has as many enemies as I have neighbours. My fellow citizens have no objection to their dogs destroying my sheep, but a very great one to see my dog kill

their dogs; here sir I want your help, here the welfare of the country requires your eloquence, to prove that it is ungenerous and selfish, to prefer the death of a valuable Merino, to that of an insignificant whelp or cur.

I annex to this a picture of Montagne, with his dimensions, he is a fine animal, *entirely white.* I prefer that colour in recollection of the story of old Jacob. In fact I had formerly a black dog, and many of my lambs were born black. Since I have Montagne and his mother, I have very few black lambs.

The natural instinct of this animal is to guard your sheep against wolves and dogs; no other training is required but to keep them constantly with your flock, the moment they are from the litter, until they are grown.

P. BAUDUY.

On Succession of Timber, by R. Peters, President of the Agricultural Society.

Read April 12, 1814.

Belmont, March 22d, 1814.

Dear Sir,

I had considered the subject of changes of timber, on spots which had been deprived of precedent growths, either by artificial or natural means, to be at rest. I conceived that, although publishing the facts related in our first volume, had excited the curiosity of some, and the incredulity of others; yet the circumstance was generally acknowledged by every one who had given themselves the trouble to attend to it. I was surprised, however last year, by its having been asserted, that the country in which our valley forge encampment was situated, during the revolution-war, would incontestibly refute my doctrine. I had witnessed, at the time, the havock and vast scene of destruction among the timber there. Knowing the extent and variety of the desolation, my curiosity was excited to gain information of the renewal, or succession of the timber. I accordingly wrote to *Isaac Wayne*, Esq. the worthy son of my old friend, the late *General Wayne*. It seems that his letter, containing the information I wished, most unfortunately miscarried. He has, however, been so obliging as to send the enclosed account of facts, from his recollection. It sufficiently proves every thing required. So far from justifying the suggestion I have before mentioned, it

fully supports the facts and opinions I had formerly promulgated. These are now generally agreed to be correct; though at first many had doubts respecting them. Every opportunity I have had, has fully confirmed what I have asserted. I never attempted to account for this wonderful occurrence in the course of natural operations. Theories as to plants, and the necessity of *changes*, are to be found in celebrated writers. Practical and intelligent farmers find them indispensable. The great use of the facts concerning changes of timber, is, to incite us, in our agricultural pursuits, to regard the phenomena, which the beneficent Creator exhibits, in the grand scenery of nature, for our instruction. The propensities evidenced in natural products, to changes and successions on a great and extensive scale, point out, most evidently to us, the wisdom of imitations in our more contracted concerns; by attending to the salutary practice of changes and rotations of crops. It was with a view to their exemplary and practical advantages, that I gave, at first, and now repeat, the information, with which I troubled the society.

Your's, very sincerely,

RICHARD PETERS

DR. JAMES MEASE.

Isaac Wayne, Esq. on Timber at Valley Forge.

Eastown, Chester County, March 4th, 1814.

Dear Sir,

It is a source of regret to me, that my letter to you, either of September or October last, should have miscarried; especially as the enclosures were completely corroborative of the opinions and facts which you have repeatedly stated on the subject of the change of timber; and I regret the miscarriage of this letter the more, because I have not a copy of either the letter or the enclosure; and death has recently deprived me of a very valuable source of information, the late worthy *John Bartholomew*, Esq. whose statement was enclosed, setting forth in detail many facts and observations relative to the change of timber; more particularly of that, on, and within the vicinity of the old encampment, near the Valley Forge.

From the best recollection I have of the said statement; it contained (inter alia) the following facts.

That the timber prevalent about Valley Forge, previously to its being fallen for the use of the American army, in the autumn of 1777, and winter and spring of 1778, consisted of white oak, black oak, spanish oak, rarely interspersed with scrubby chesnut and hickory.

That the ground on which white oak was formerly the most conspicuous, now exhibits black oak, hickory and chesnut, in abundance, and in great perfection.

That where black oak had been most general, white oak, hickory and chesnut now plentifully exist.

That of the hickory and chesnut, there were at least 16 to 1 of what grew on the same ground in the year 1777; and that these two latter species of timber, were now flourishing, in the highest degree, in many places where no other timber formerly grew, than white oak, black oak, and Spanish oak.

That notwithstanding the old encampment, and the ground within its vicinity, yet present considerable quantities of timber, similar to that which was cut in the autumn of 1777, and the winter and spring of 1778; it has originated almost universally from the old stumps or roots.

Since I had the pleasure of last conversing with you on the subject of the change of timber, I have availed myself of opportunities of mentioning to several intelligent characters, the statements which I have received, with respect to the change of timber, on the ground of the old encampment, and its vicinity; and they have, without exception, confirmed the general facts above stated. I have only to add, that from recent information, the farmers, in many parts of this county, are so decidedly convinced of the change of timber; that they reluctantly cut their full grown white oak, black oak, and hickory; knowing that these species will be succeeded by some other, of a quality inferior for fuel. Believe me to be, Sir,

with great respect,

your obedient servant,

ISAAC WAYNE.

RICHARD PETERS, ESQ.

Observations upon Mr. Neill's Hedges, and on the mode of trimming Thorn Hedges, by James Mease, M. D.*

Read, August 10, 1813.

Being desirous of knowing accurately the mode adopted by Mr. Neill, in making his hedges, I paid him a visit on the 26th of last month. I found his hedges to consist of the following species of thorns.

1. The American cockspur, (*Cratægus crus galli,*) which grows abundantly about Newcastle, in the state of Delaware, and other places.

2. The Virginia, Maryland, or Washington thorn, (*Cratægus cordata,*) which has been so highly praised, and cultivated by Mr. Main, of George Town, district of Columbia,† and called by him the American hedge thorn.

3. The great American hawthorn, (*Cratægus coccinea.*)

4. A variety of this last species.

5. The English white thorn, (*Cratægus oxycantha.*)

They are all planted in the manner described by Mr. Neill, in the present volume, but the first and second species well deserve the preference bestowed on them, by those who have tried them. The second is inferior to the first, only because the haws vegetate sooner: that is, the first season they are sown; whereas the others will not grow until the second year.

* See page 11, of this volume.

† See Memoirs of the Philadelphia Society for promoting Agriculture, Vol. II.

The *Cratægus coccinea,** or great American hawthorn, is inferior to all the rest, in the following respects; 1st, The spines are much shorter, and less numerous than those of the Newcastle, Virginia, or English thorn. 2d, The plant, although it grows vigorously, early in the spring, according to Mr. Neill, makes no progress after the month of May, and then begins to lose its verdure, the leaves to wrinkle, or curl, and to become rusty, and their upper surfaces to be covered with a white down. The branches are also rendered unsightly by warty excrescences, of a reddish hue, which in some cases embrace and surround them, and in others project from them, like the spur of a cock, which they also resemble in size; so that the whole plant is sickly, and has a disagreeable appearance. 3d, Its progress in growth is slow.

The other species of American thorns, composing the hedges of Mr. Neill, looked healthy and vigorous, and the leaves of the Newcastle thorn in particular, exhibited a very deep green colour, and that high gloss for which they are so remarkable; while its numerous long spines seemed to defy all intrusion from man or beast. The branches of this species coming out low, constitute a great defence against pigs, and may indeed be said to form the perfection of a hedge. Each plant sends out from five to eight top shoots, each three feet long, besides numerous shoots in the course of the season. The spines of the English white

* See Miller's Gardener's Dictionary; and M'Mahon's Gardener. It is the *mespilus coccinea* of Marshall. See Arbustrum Amer.

thorn are not more than half as long as those of the Newcastle thorn: the leaves of some of the plants were beginning to look red when I saw them, preparatory to their dropping. Mr. Neill informed me, that about this time last year, the plants were entirely leafless. I have observed them in other years to keep their leaves until August; whereas the Newcastle thorn holds them until even after frost: but they have the advantage in the leaves coming out two weeks before the cockspur thorn, in the spring, and while they last, the hedge has a neat appearance. The Washington thorn (*Cratægus cordata*) grows straight, is thrifty, and the plants present a singular uniformity in their appearance. Mice and moles are very destructive of their roots.

Upon inquiring of Mr. Neill how he supplied live plants in place of those that die, (as they often do in hedges,) without deranging the wall or bank, he said, that in case of a plant dying, he plucks it out, and thrusts in a dibble to enlarge the hole left by it, then inserts a fresh thorn plant, pushing in some rich earth after it, and finds that it takes root without difficulty. In the hedges planted from four to six years, I saw no gaps, but on the contrary, a uniformity of growth, which was highly pleasing. In a hedge about two years old, I saw only one vacancy. When a gap takes place in an old hedge, he draws the bodies of the two nearest plants as close together as possible, by means of a cord, and in one season they take the desired set, and fill up the vacant space. This method he thinks preferable to plashing. He does not think a double row, one above the other, (the upper plants being placed in the spaces left by the first row,) so

eligible as single rows, having each plant six inches apart.

Mr. Neill obligingly went through the whole process of making a sample of a hedge, according to the directions given by him in the present volume. A few particulars which he has omitted to detail, and some other facts respecting his hedges, shall now be noticed.

The stones are not laid edge to edge, but are lapped, or ride one another a little: and in the progress of the wall he takes care to keep the earth closely packed behind it, as by throwing it in loosely it sinks, and causes the stones to lean too much back from the hedge. After the plants are laid and covered with earth, and the first row of stones is placed upon it, no more earth is used for the upper rows than is sufficient to fill up their inequalities, and cause them to lay regularly. If more were used, it would of course freeze in winter, and when thawed in the spring, the stones, by being forced out, would destroy the wall, which it is of consequence to preserve.

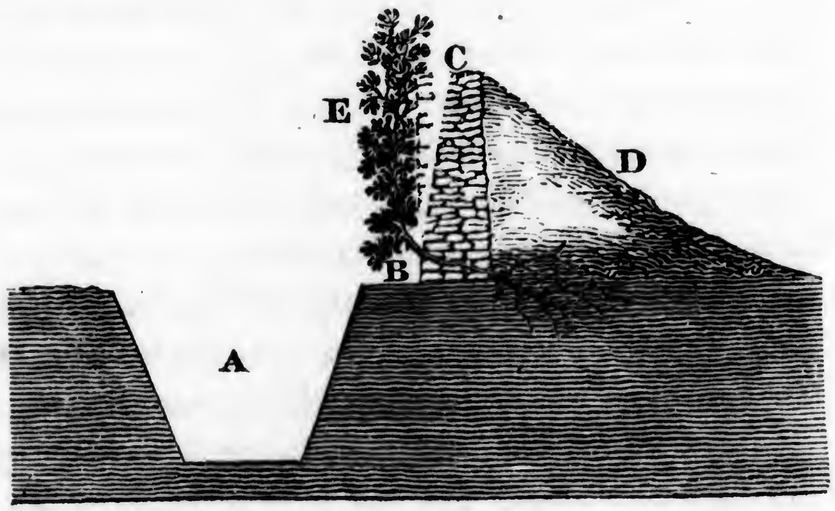
Mr. Neill says it is important to state, that a wall of three and a half feet in height, ought not to lean back more than three or four inches from the perpendicular. The age of the oldest hedge of Mr. Neill is six years, and is eight feet high.

Independently of other considerations, one point in which the superiority of Mr. Neill's plan is evident, consists in the lower or first rows of stone preventing the growth of weeds among the thorn plants, which often retard the progress of thorn hedges, whether planted on a plain surface or on a bank; and as the la-

bour of weeding them is very great, many hedges are abandoned to their fate, after a zealous commencement of planting.* What few weeds do spring up, in front of the thorns, are cleaned very speedily with a hoe, by a boy. Mice are not so troublesome among the roots of thorns planted in Mr Neill's way, as when growing in the common way.

The injurious effects of the trimming which Mr. Neill gave his hedge last summer, was very evident, and cannot fail of striking every one who sees the stunted plants in the same row with others of the most luxuriant growth, which were not trimmed.

The annexed cut represents Mr. Neill's hedge. But the thorn ought to have been represented as growing close to the wall.



A, Front view of the ditch.
B, The front of the bank, twelve inches broad, and

* Fresh slaked lime, spread among thorn plants, will almost effectually prevent the growth of weeds.

showing the mode of placing the thorn plant, and its growth.*

C, The top of the stone wall.

D, The slope of the bank behind the wall.

E, The thorn plant, growing up in front of the wall.

A hedge somewhat resembling Mr. Neill's, is noticed in the communications to the British Board of Agriculture, vol 2, page 90,† as having been made to a considerable extent by Sir James Hall, of Dunglass, in East Lothian, who, it is said, "first introduced it on the East Coast (of Scotland) from Gallom." We must therefore suppose that it is common in the latter district. It differs however, from Mr. Neill's, in a stone wall being carried eighteen inches or two feet high, before the thorns are laid down; and hence Mr. Somerville remarks, it would seem impossible to supply any deficiency that may take place from weakness of the plants, or accident, without taking down the wall at least as low as the place where the dead plant was laid, and if such deficiency should occur in several places in the wall, the expense of repair would be great, and the task arduous, whereas in Mr. Neill's hedge, vacancies are easily filled up, and is therefore preferable on that account, as well as by reason of its requiring fewer stones.

* The cut represents the thorn in a sloping direction, but this is unnecessary in laying them; for they will take the perpendicular direction, although laid horizontally, as directed by Mr. Neill, page 12, of this volume.

† The paper is by Mr. Somerville, of Haddington, and entitled "Observations on the various modes of enclosing land." It is illustrated by numerous plates, and is highly interesting.

Mr. Neill's land is part of a tract that begins at the Spread Eagle village on the Philadelphia and Lancaster turnpike road, and continues to the tavern, sign of admiral Warren, for the distance of one and a half miles, embracing about a mile on each side of the road, and noted for the extreme poverty of the soil. A reddish steatite in small pieces, is so intimately mixed with the soil as to constitute an essential part of it: and yet though naturally extremely poor, it is capable of very great improvement by lime and gypsum, as Mr. Neill has evinced: the sub-soil is a light yellow loam.

It was mentioned in the beginning of this paper that the American cockspur, or Newcastle thorn would not vegetate until the second season; unless a particular process be used.

The following fact on this head is given by Mr. Bordley. "The late Gen. Cadwalader sowed haws of the country without effect, until he was informed that young thorns were seen to be grown through the cow dung dropped near a road. From this hint he penned up a number of cattle and fed them during winter, with bran mixed with haws. The place was then plowed up and the dung of the cattle covered with earth. In the summer, the ground was there abounding in young plants of the country haw, but they were soon much injured by grass and weeds, for want of the ground being previously fallowed or cleaned."* All we have to do, therefore, is to collect the haws when ripe, taking care to spread them out on the floor of a loft to prevent their spoiling, and to feed cattle with them; to heap up the dung, covering the mass with earth, as it enlarges, and to sow the cow dung and earth in drills early in the spring, in ground previously cleansed;—whence the young plants may be transplanted to the spot intended for their reception; or if planted on the surface, they may be sown in trenches on the borders of the field previously prepared for them, by a crop of potatoes or turnips or a clean fallow. They may be thinned as they grow to the proper distance, and the spare plants removed to other places.

* Notes on husbandry, 2d. edit. p.198. 1801.

The following practice of a "judicious farmer" in the vale of Pickering, Yorkshire, may be profitably adopted with the haw of the Newcastle, or cockspur thorn. "His practice has been to plough a slip of ground on each side of the intended line of the fence, the preceding spring; and having previously dunged it, he planted it with potatoes. During summer, the land is repeatedly cleaned with the hoe; in autumn, the potatoes being removed, the entire slip is gathered into a ridge with the plough; and the ensuing spring the quick is planted, nursery-wise, in a trench run along the middle of the ridge. The success of this method has proved equal to what might be expected from management so obviously judicious." *Marshall's Economy of Yorkshire, vol. I, page* 202, *London*, 1796.

On pruning hedges.—The injurious effect of summer pruning is mentioned by Mr. Neill, and his experience accords precisely with the remarks of Dr. Anderson of Scotland, one of the very best authorities on every subject either connected with agriculture or any other on which he treats. He was a practical farmer and

a man of education, and never wrote on any subject capable of experiments, without fully testing his opinions by practice. Mr. Neill's experience also agrees with the directions of Mr. Somerville in the communications to the board of agriculture, vol. 2d.*

Mr. Main does indeed admit of a trimming in the latter end of June, when the hedge has generally terminated its annual growth; but he confines this to a hedge growing "on a strong soil, when in its fifth year," and when the "shoots are large and rank."† He speaks, however, of the American thorn (cratægus cordata.) The Newcastle or cockspur thorn grows 'till frost, and was not cultivated by Mr. Main. Anderson and Somerville, refer only to the English white thorn. Mr. Main on the whole agrees with both these authors, in their directions about pruning.

* See Appendix.

† Memoirs Agric. Soc. Philad. vol. 2d. Appendix, p. 32.

Singular hardihood and sufferings of a Bull.

Read April 12, 1814.

Upper Merion, Montgomery Co.
February 3d, 1814.

Dear Sir,

As your society are preparing matter for a book of information and facts, for farmers; perhaps the following occurrence may be somewhat interesting to its readers.

On the morning of the 21st of July, 1811, A bull, belonging to my brother William, was missing out of the pasture field.—Search was made for him throughout the neighbourhood, but all to no purpose.—And, —astonishing to relate;—on the 14th of August following, he was found alive, by some boys, in the same field he was missing from. He had fallen into a lime stone sink, from eight to ten feet deep; in which situation he lay twenty four days; without any thing to subsist on but the air.—And, what still added to his sufferings, he lay on the north side of the hole; and was exposed to the hot rays of the sun, for at least eight hours in the day. I was present when he was taken out of his solitary confinement. The lower part of his belly and hind parts were completely mired. Nearly all the hair, and part of the hide, came off; when exposed to the air. When he was first taken out, he could not stand, without support; being almost nothing but a skeleton. A bucket of water was put before him, but he drank very sparingly; not exceeding

two quarts. Some grass was given him; but he ate as sparingly as he drank. Next day he could walk a little; and in two weeks he could go with the rest of the cattle. The next season he was fattened, and weighed near a thousand weight.

If you think the above statement worth publishing, you are at perfect liberty to do so; as the fact can be attested by a number of witnesses.*

I am your's, &c.

GEORGE W. HOLSTEIN.

RICHARD PETERS, ESQ.

* Our correspondent has not mentioned the state of the bull, as to fatness, before falling into the pit. Many authorities could be cited, to show, that an animal will live, or linger, without food, for times proportioned to its fatness, or the contrary. No doubt the animal, respecting which this extraordinary anecdote is related, must have been in high order, as to fatness.

See Vol. II. "*high estimation of broad tailed sheep.*" v, vi. cites *Scheuzer. Physica Sacra.* Tom. 1, pag. 231. *Ulm*, 1731.

The writer of the foregoing letter is a person of the most unimpeachable character. The fact he relates can be attested by multitudes of people, who were eye witnesses. On inquiry I found the bull was fat, precedent to his falling into the pit. R. PETERS.

On a Fire Stone, by Richard Peters, Esquire.

Read May 10, 1814.

May 6th, 1814.

Sir,

Mr. GEORGE KREBS, an intelligent and long experienced brick-maker, of Philadelphia, spoke to me, a long time ago, on the subject of a most valuable FIRE-STONE, which lies, entirely neglected, though in great plenty, in the quarries on my *Belmont* farm, near the borders of the tide water of the Schuylkill. I have repeatedly endeavoured to obtain such an account of this stone, from persons of mineralogical knowledge, as would enable any one, standing in need of such stone, to find it, at places convenient to them. I have no doubt of its being dispersed in many parts of our country; it being, to all appearance, a common stone. But I have, on this, as on many other occasions, been disappointed. I have, however, received the following short description.—"The stone appears to be a fine granular aggregation of *quartz* and *black mica*,—a variety of *gniess*."

Any person desirous of experimenting, (if that be necessary,) or using it, for furnaces, fire places, and all works requiring such material, may have, out of my quarry, what they want, either for actual use, or for comparison with stones in their neighbourhood. Some experience is necessary, in the selection. There must be no *flinty veins*. I have had the stones in the backs of chimnies, and ovens, unhurt, for fifty years. The

late Mr. *Reuben Haines*, then an eminent brewer, in Philadelphia, from no other than a public motive, advertised, in a newspaper I cannot now find, before our revolution, the valuable and singular qualities of the stone procured from my father's quarry; (the one now mine,) by his predecessor in the brewhouse, Mr. *Matlack*. Those he mentioned had been under the copper of the extensive brewery, now occupied by *Morris* and *Gaul*, in or near Market street, for a period, I think, of sixty years. They were, at the time of Mr. Haines's advertising the circumstance, entirely uninjured; and even the marks of the tools undefaced. I enclose the certificate of Mr. *Krebs;* who expresses a laudable anxiety, that others should experience the like advantages he has received, from the superior qualities of this material. For myself, I have no objects of personal interest; but wish the subject introduced for inquiry and multiplication of materials, essential in furnaces, manufactories and fire places of every species.

I am, your obedient servant,

RICHARD PETERS.

DR. JAMES MEASE.
Secretary of the Philad. Agric. Soc.

A specimen of this stone is preserved in the Cabinet of the Society.

Certificate.

I do hereby certify, that the FIRE STONE I procured out of the quarries of Judge Peters, near the Schuylkill, and on his Belmont farm, have been exposed to the fires of my brick kilns, for a period of sixteen years,

during every fortnight, of seven months of each year. Each kiln consumes, at one burning, about sixty cords of wood. So that no heat of the kind can be more intense. I see not the smallest defect in the stone. From their present appearance, I cannot anticipate any reasonable period, when their duration will end.

I have tried stone procured on Morris's Hill, near the upper ferry; but they are very inferior to those obtained out of the Belmont quarry.

I have used *soap stone*, which spawl (scale) with the force of fire in my kilns. The *Belmont stone*, not having flinty veins, never spawls. I therefore prefer the latter, decidedly, to the former; which although fit for more moderate heat; will not resist the severe force of the flame and fire of my kilns. Independent of this circumstance, the original price, and expense of workmanship of the *Belmont stone*, bear a proportion to those of *soap stone*, in a degree very moderate indeed. At least half the price, both of stone and workmanship. Judgment and experience are required in the selection. Flinty veins, and very hard stones, are to be avoided. But great plenty of the proper kinds are to be found in the quarry.

I have been a brick-maker forty six years; and in very extensive business, during thirty five years of that period. Persons desirous of viewing the stone, will gain more knowledge of its qualities by viewing my kilns, than from the most elaborate description on paper. My kilns are situated in Chesnut street, on Sixth and Seventh streets from Schuylkill.

GEORGE KREBS.

May 6th, 1814.

Some account of the Virginia Crab Apple, by the Hon. Timothy Pickering.

Read May 10, 1814.

City of Washington, April 7, 1814.

Dear Sir,

I duly received your letter of the 4th, in which you mention your fruitless attempts to get "the history of the Hughes's, or Virginia crab apple;" and suggest that perhaps it might be obtained at Washington.

Having lately conversed with colonel John Roan, of Virginia, relative to an apple of distinguished excellence for cider, which he has cultivated; and observing in him a disposition to more than ordinary attention to the subject generally; it seemed probable that I could derive from him the most satisfactory information concerning Hughes's crab. I have just returned from visiting him.—As I had some knowledge of the apple, my first inquiry respected the *age* of the *species*. His answer was general, that the name was common, from his earliest remembrance; and that it must be a very ancient apple. Presently he recollected, that about twenty years ago, a Virginia gentleman of the name of West, then about ninety years old, mentioned an orchard, consisting wholly of Hughes's crab, which was planted when he (Mr. West) was a boy, on the plantation now owned by colonel Roan. Some of the trees remain, and continue to bear well.

Colonel Roan remarked, that there are several varieties of Hughes's crab, varying in appearance and good

qualities for cider. The sort on his land is but faintly striped with red; but produces cider, he thinks, of the best quality, and resembling, more than any other, Champagne wine. The Hughes's crab apple that I have met with, has been nearly covered with dull red stripes. In their sizes, the apples of the different varieties pretty well agree, all being very small, with long stems, and growing on slender twigs: from all which circumstances it was to be presumed, that the fruit would hang on well; and such is the fact. He says the *wood* of Hughes's crab apple tree is exceedingly close and hard.

I observed to colonel Roan, that the leaf of my young Hughes's grafted crab differed from the leaf of all other apple trees; resembling, in its shining and smooth surface, the pear leaf much more than the apple leaf. This he said, was characteristic of Hughes's crab.

But colonel Roan prefers his own crab to Hughes's: and this is its history.—In the year 1790, going with his father, in the month of October, to view a patch of tobacco; as they were passing an apple tree (situated among briars,) from which the apples had fallen, and covered the ground; his father told him to pick up one for him to taste. He answered, that they could not be good for any thing, or the negro children would have eaten them up. His father persisted, and on tasting the apple, pronounced it excellent; and directed his son to have them collected the next day. It was done. They were made into cider, producing about nine gallons; which proved to be of an admirable quality. In consequence, in the year 1792, an entire orchard was planted and grafted with this fruit, to which has been

given the name of *Roan's white crab.*—To my inquiries of the size and probable age of the original tree, colonel Roan answered, That it was in the stem about the bigness of his thigh—say seven or eight inches in diameter, and sound. It was killed by accident.—Some brush having been cut and thrown about it, the negro children set fire to the brush, and so destroyed the tree. Its natural growth is smaller than that of any other apple tree; but it bears much sooner, after grafting; a circumstance which colonel Roan ascribed to the dwarfish character of the tree: but it is a great bearer, every other year. In extending his plantations of this apple, he sets the trees nearer together than other sorts. He has one orchard, in which the rows are sixty feet apart; but the trees are only fifteen feet apart in a row.—He grafts the stocks when small, and so near the ground, or rather a little below the surface, that the grafts are, eventually, partially sustained by their own roots.—The wood of this tree, like that of Hughes's crab, is close and hard. The skin of the apple is pale yellow; its size a little bigger than Hughes's crab; and the juice very sweet, but not abundant. The pulp being more tender than that of Hughes's crab, more of it mixes with the cider, in the process of grinding; whereby the *fining* is more difficult than that of the cider of Hughes's crab. It will occur to you, that the intervals of sixty feet between the rows, were designed to render the cultivation of any crops in the orchard more easy and convenient, and such is colonel Roan's object in the experiment. I am dear sir, your's, &c.

TIMOTHY PICKERING.

RICHARD PETERS, ESQ.

POSTSCRIPT.

A few years ago, when general Sumter, of South Carolina, was in the senate, he told me that the juice of his Hughes's crab apples was so rich as to be clammy. Quere, if a transfer of apples of thin, meagre juice to the south, and those of rich, thick or viscous juice to the north, would not produce a valuable improvement? T. P.

On the utility of grinding Maize (Indian Corn) in the Cob, as food for Cattle, with a description of a Mill for the purpose, by James Mease, M. D.

Read, May 10, 1814.

The practice of grinding Indian corn in the cob, to powder, for the purpose of horse feed, is now common with our German farming fellow citizens. Those industrious men are ever attentive to the health and general welfare of their farm stock, and readily adopt any measure calculated to promote either object, and as they are convinced of the nourishing qualities of the cob, and the economy of the practice of using it as an article of food, they have encouraged the general erection of the necessary apparatus, in the flower mills in their different settlements.

The first apparatus used for the purpose of grinding corn in the cob, was a screw, which was originally invented by Oliver Evans, of Philadelphia, and now in general use to break gypsum. Mr. Evans first reduced it to practice in the year 1795, but no measures having been taken to give publicity to it, the knowledge of it was diffused very gradually through the country; and it even appears that private offers for the gratuitous use of it were ineffectual, (until after some years,) in causing a trial of what is now deemed an economical practice of the first consequence.

It was not until the year 1803, that I heard of the practice having been adopted in Lancaster county, and in 1804 I had great pleasure in seeing it in operation, in a mill on the Perkiomen creek, in Montgomery

county, Pennsylvania. I was so fully persuaded of the utility of the practice, that I wished to profit by it, and endeavoured to persuade a miller in Delaware county, near to where I had a farming interest, to erect one, but without avail. His scruples arose from an apprehension of an insinuation on the part of some people, that he would mix the meal of the corn and cob with his wheat flower, and he well knew that the mere suggestion of such a practice might prove injurious to his reputation.

Indian corn is of itself too nourishing, and too heating as a constant article of diet for horses, and if fed alone, a sufficient quantity cannot be given to them to produce the stimulus of distension, (which is as necessary for a working horse, or even to man, as nourishment,) without great expense, and at the same time endangering the health of the animal. Corn meal is therefore mixed with a portion of cut straw, and coarsely ground rye, or shorts, and in this state constitutes the daily food of that fine body of draught horses that do so much credit to our draymen and carters of Philadelphia, and the industrious farmers of the state at large.

The powder of the corn cobs, however, does not act entirely by distension: it also contains much nutriment, and I have heard of a poor woman in Maryland, who prepared during the winter, a very grateful daily mess for her cow, by boiling the bruised cobs with which she was furnished by her wealthy neighbours; with this liquor, mixed with what other vegetable matters she could procure, and a few corn blades, she

supported her cow well through the winter and spring, until the return of grass.

The screw of Mr. Evans's invention is set to revolve over a grate, fixed in the bottom of a hopper, strongly made, and plated inside with iron. The corn in cob is thrown into the hopper, and taken hold of by the screw, and as fast as they are broken, they fall through the grate, and are guided by a sloping spout into millstones, or into an elevator, to be raised to the millstone hopper. But it is improper to use the same apparatus for both plaster and corn, on account of the impossibility of cleaning it sufficiently on an emergency, when wanted to grind corn, from the dust of the gypsum, which of course would mix with the corn flower, and cause injurious concretions in the intestines of the horse.*

Explanation of Henry Dotterer's invention for breaking Plaster of Paris, and Corn in the Ear, and shelling Corn, and grinding Bark, and other hard substances.

Fig. 1. Represents the machine in a frame, with a wheel attached to the spindle, which may either be connected to the bolting gears, or any other part of a grist mill, as best suits, or may be turned by hand. A, the hopper, which is of cast iron; B, the frame in which the hopper A is fastened by four screws, CCCC,

* Such concretions have been formed in several horses in Pennsylvania, after having been employed for some time to turn a mill for grinding plaster.

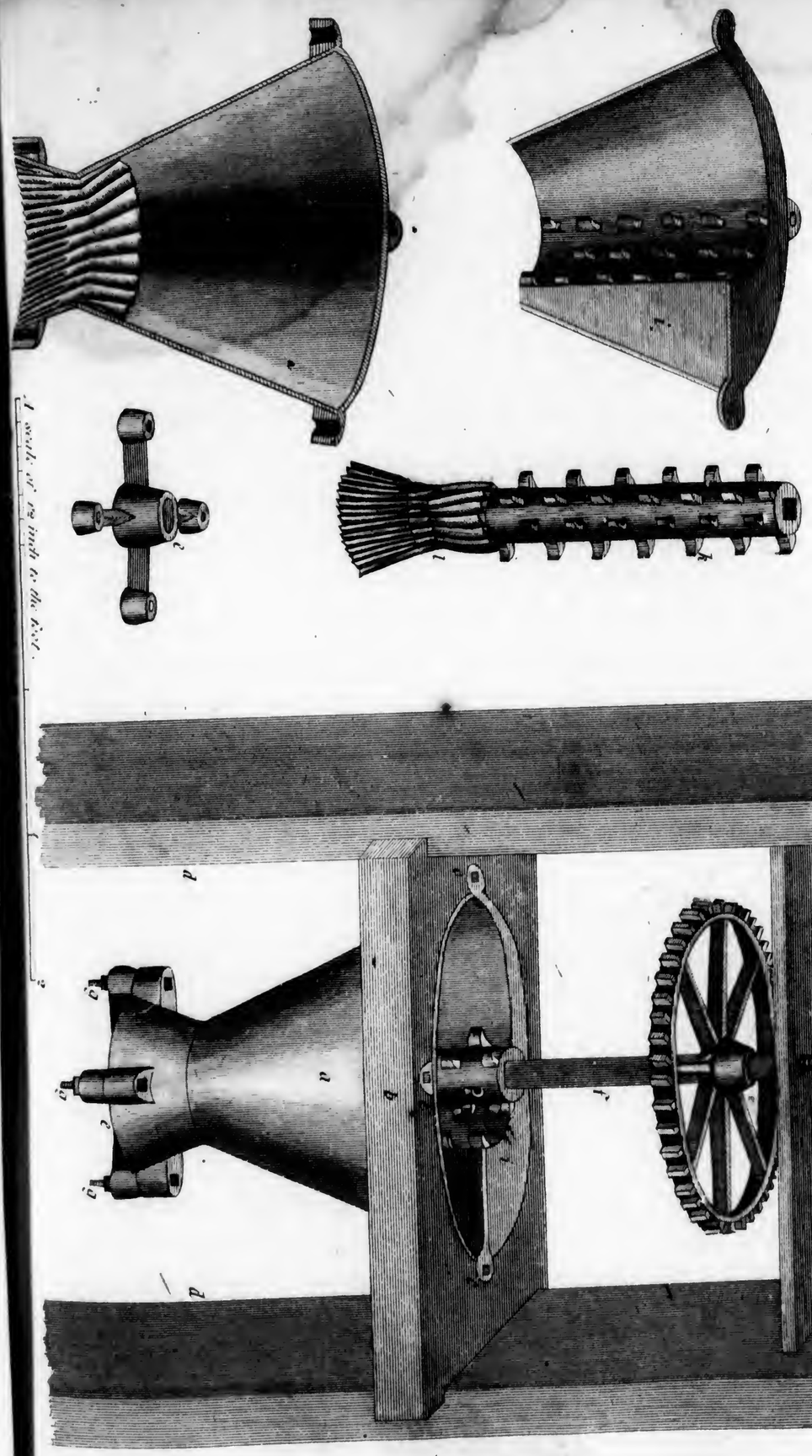


Fig. 2.

Dotterer's Plaster & Corn Mill.

Fig. 1.

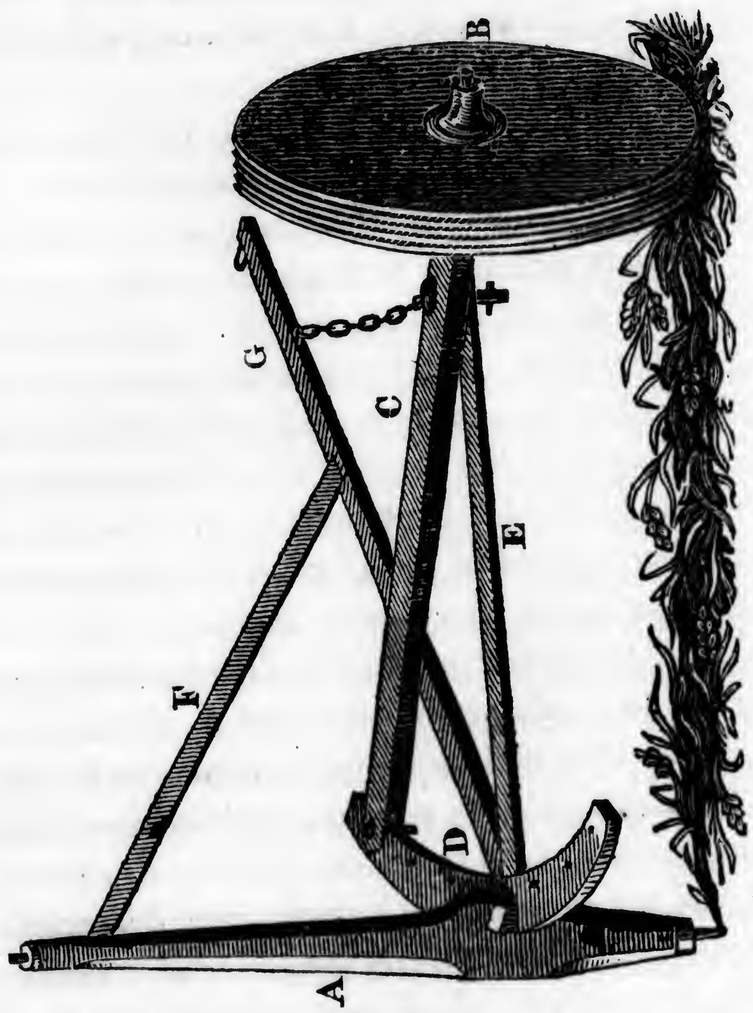
which frame B is fastened in the two upright planks DD. E, the step in which the foot of the spindle F runs in, which step E is regulated by four screws, GGGG. H, the head piece, in which there is an iron screw, similar to the screw in a turning lathe, by which the spindle F is screwed down so as to keep it from raising out of the step E. I, a cast iron piece, which is more fully explained in fig. 2.

Fig. 2. A represents the inside of the hopper A, in figure 1. E, the step in which the spindle runs. K, the sleve, and L the nut, which is made of cast iron, with a square inch hole through the middle, so as to admit of the spindle F, in fig. 1, which is wrought iron. I, a cast iron piece, with teeth, similar to the teeth in sleve K, which is used in breaking and shelling corn, and grinding bark, but is taken out in breaking plaster of Paris and other hard substances. Also the sleve K, and another applied in the place of K, with teeth in half the length, but of a similar shape.

When this machine is used for shelling Indian corn, there is a fan underneath the hopper A, similar to the fan of a shelling mill, and put in motion at the same time the machine is, by which the cob is blown away, but in breaking corn in the ear, the fan is put out of gear, and the corn and cob come from it together. This machine, when properly put in motion, will break corn as fast as three pair of four and a half feet stones will grind it; and will shell four hundred bushels of corn in twelve hours.

A description of the improved patent Bark Mill, or machine for threshing Grain, called the Pennsylvania Rubber, with directions for using, by Caleb Churchman and George Martin, Jun.

Read June 14, 1814.



A, represents an upright shaft, with an iron gudgeon in each end, standing on the centre of the barn floor, or other place where the machine is intended to be used; B, a wheel five feet in diameter, eighteen inches in thickness in the centre, and twelve on the tread,

which is cut in large grooves; it is made of three or more square pieces of wood doweled together, in the centre two iron boxes are placed, to receive the axle; C, an axle nine feet long, one end of which passes through the wheel, having a whirter fastened on the under side, also a washer and lince pin; the other end has a mortise or notch cut in it to receive the curved edge of a plank marked D; this plank is five feet in length, by one and a half inches in thickness, and is fixed horizontally in a notch cut in the side of the upright shaft, and made fast by a wedge on the upper side. The part marked E, is seven feet long, one end of which is fixed in a mortise in the upright shaft so loosely as to admit of the wheel rising at least one foot from the floor, the other end is fastened to the under side of the axle near the wheel, by an iron pin through both; by this means the end of the axle may be removed to any part of the curved edge, and may be fixed by a pin at pleasure. The piece marked G, is added for convenience in fastening a horse to the machine, one end being fixed in the upright shaft; it is supported a proper height from the floor by a brace marked F, and is connected with the axle by a chain seen in the plate.

The above dimensions are given for a machine to work on a floor twenty feet square; for a larger or smaller floor the dimensions of the machine should be proportionally increased or diminished in all its parts. In order to use this machine to the best advantage in threshing grain, the straw should be unbound and thrown around the upright shaft, and the end of the axle drawn backward to the end of the curved edge;

the wheel being put in motion, will, with a little attendance, remove the straw outside of the circle which it describes; which being done, the end of the axle should be removed forward to the other end of the curved edge, and the straw will then be removed inward; in this manner the operation should be continued, till the straw is sufficiently clean, the loose grain need not be removed till several floorings are threshed.

It is presumed the expense of erecting this machine will not exceed ten dollars.

Those who wish to make the experiment, may substitute two cart or wagon wheels in place of the large wooden wheel; to accomplish this, one end of the axle of the hindmost wheel should be fixed in the upright shaft; this axle should also have a crook or bend in it near its entrance into the wheel, forming an angle with the radius of the circle, of from fifteen to twenty degrees, this will give the wheel an inclination to run inward, which will remove the straw outward; the other wheel should have a straight axle, fixed in a mortise, in the middle of the hinder axle, and the two axles connected firmly together.

As these machines will answer for threshing all kinds of grain, particularly clover seed and even flaxseed, it is presumed their cheapness, with the great progress they make in threshing, will sufficiently recommend them to the farmers generally.

Chichester, Delaware Co. Penn.

Numbers of this simple and economical substitute for a threshing machine, are erected in Delaware county, and are found to answer the purpose fully. A neat model is deposited in the cabinet of the Agricultural Society, for public inspection. J. M.

On Taurino Cloth, by Messrs. Shotwell and Kinder, of New York.

Read June 14, 1814.

New York, 5 mo. 8th, 1814.

Respected Friend,

Thine of the 3d instant addressed to our William Shotwell, was duly received. We feel highly gratified that our patent Taurino fabric should have met the approbation of a body so respectable, and so well qualified to give an opinion on the subject, as that of the "Philadelphia Society for promoting Agriculture."

Having discovered a method of disengaging the hair of black cattle from the dandruff and lime, which were left in it; we conceived the idea that a cloth could be made from it, which might be applied to many useful purposes; and notwithstanding the discouragements from many English woolen manufacturers, of high credit, and many unforeseen difficulties, which we had to encounter, we have succeeded in attaining the object of our pursuits. We can now make a strong heavy cloth from hair alone, suitable for carpeting, &c. and which, if wove rather loose, and not much fulled, might be used for coarse blankets, and doubtless for many other valuable purposes. By selecting the white and black hair, and leaving the other colours as a third, we can make a neat figured carpeting, with three colours, without dying; and should more colours be required, the red hair can be dyed green, blue, olive, or any dark colour; so that a carpet from hair can be produced, equalling in fancy, and exceeding in durability

any that can be made of wool. We have also made excellent coatings of it, calculated for over coats and clothing for labouring people: this has generally a small portion of wool intermixed with the hair, the whole of which we believe can be afforded at a lower price than any woolen fabrics of an equal quality, that can be imported from England. The carding, spinning, weaving and fulling, are done with a facility equal to wool.

A committee of the society for the promotion of useful arts in this state, to whom specimens of the cloth have been submitted,

"Report, that they have examined said specimens, "amounting to four in number, that they find two of "the samples exhibited to consist of one third com- "mon wool, and two thirds hair from the tanneries; "one sample of one fourth common wool, and three "fourths hair; and one of one fifth common wool, and "four fifths hair.—That they find the whole number "of specimens extremely well manufactured, of equal "quality and texture, well dyed, and apparently very "firm and strong.—The committee further report, "that from documents accompanying the specimens, "it is certain that a cloth equal, if not superior in du- "rability, is manufactured from hair alone, and that it "is a valuable substitute for felting, in the paper ma- "nufacture.

"The committee have satisfied themselves by ex- "periment, that this cloth is not only lighter than that "manufactured from wool, but that it has the proper- "ty of resisting moisture to a much greater degree, "and that therefore it is much better calculated for "great or over coats; and further, that from actual

"trial, it forms an equally elegant, and much more du- "rable carpeting than wool.—The committee feel a "degree of pride in having to state, that this invention "which converts a hitherto useless refuse into a useful "and highly important branch of manufacture, has ori- "ginated in our own state; and we feel a degree of "confidence, that a discovery of so much real practi- "cal importance, will meet with the patronage of the "public generally, but particularly of the legislature."

(Signed.) James Low,
Horatio Gates Spafford,
E. C. Genet.

Thomas Jefferson, late President of the United States, to whom also a specimen was forwarded, has been pleased to communicate his opinion of its merits, in a letter to us, in the following—

Monticello, February 10, 1814.

"*Messrs. Shotwell and Kinder*,

"Your favour of December 24th, came but by our "last mail, and with it the piece of cloth, made of wool "and hair, which you were so kind as to send me, I "pray you to accept my thanks for this present, which, "while it is an acceptable mark of good will, shows "also how important a resource we have in an article "hitherto mostly thrown away, towards supplying our "stock of wool, not yet quite equal to our wants. "Although our flocks of sheep are multiplying rapidly "in this state, they are still so far short of what are "necessary for clothing our labourers, that we are

"obliged to mix half cotton in their clothing, this has "by no means the substance you give with hair.

"I rejoice in this progress towards a real indepen- "dence, and while I hope a permanent support to those "generally, to whose spirited enterprize we are likely "to be indebted for it, I add sincere wishes for suc- "cess to your particular exertions, and with a repeti- "tion of my thanks, I tender the assurances of my re- "spect."

(Signed.) TH. JEFFERSON.

Our manufacture is still in its infancy, having established it more as an experiment, than with a view to profit; we have however made from seven to eight thousand yards of the cloth, and propose increasing it, having obtained a charter of incorporation, with a capital of 400,000 dollars; we are of opinion, and that confirmed by persons well qualified to judge, that there is enough of hair wasted in the United States, to make more than one thousand [yards] of cloth a day; if we were to estimate two thousand, we should not probably far exceed the mark. Should your society conceive any part of the foregoing worthy an insertion in your valuable work, you have the approbation of

thy friends,

SHOTWELL & KINDER.

DR. JAMES MEASE.

Comparative estimate of Expense, of live and dead Fences, by T. M. Forman, Esquire.

Read June 14, 1814.

Rose Hill, near George Town Cross Roads, Maryland, April 15th, 1814.

Dear Sir,

I am indebted to the politeness of John Prince, Jun. Esquire, of Boston, for the first number of the 3d vol. of the Massachusetts Agricultural Repository and Journal, and my attention has been drawn to an estimate therein, respecting hedges, made by the honourable Josiah Quincy.

This estimate is made exactly as all estimates for public benefit should be made, upon the greatest possible expense. But in order that it may have a full effect, a comparative estimate of post and railing should be made. This I now offer to you, and request, that if these statements meet your approbation, you will communicate them.

The pannel of post and rail fence may be fairly fixed at 9 feet, consequently 255 rod, gives 467½ pannels, say of 4 rails, 1868 rails, at 9 cents per rail, is	$ 168	12
467 posts, at 12½ cents, is	64	37½
For mauling, hewing, boring posts, dressing rails, and putting up fence, at 25 cts. a pannel, - - - - -	116	75
	$ 349	24½

Thus without considering the expense of hauling, which is often very great, the loss on account of defective posts, and broken rails, it appears that the post and rail fence will cost, within a fraction, 137 cts. a rod, and must be renewed every twelfth year, with the expense of erecting, new posts, and some new rails. We cannot count upon the duration of the white oak post for more than twelve years, but a farmer desirous to have good fencing, must reset in ten years, by which time a great proportion of the posts are rotten, and many broke. The cedar rail, very tender and liable to break, will last two sets of posts, by shortening the pannel to eight feet, and by continuing to shorten, if they were originally thick rails, will even stand a third set of posts, but they will have become extremely thin and tender.

From the comparative estimate it appears, that $ 349 24½, the expense of putting up 255 rod of fence, will pay for planting, and bringing to near maturity, more than 530 rod of permanent live and ornamental fencing.

I am inclined to believe that the Virginia thorn has but one advantage over our black or cockspur thorn. The seed will vegetate the first year, but the spines or thorns, in which the strength of the fence consists, are much smaller and weaker. Plant none but healthy, well rooted seedlings of the black thorn, cultivate and manure them with equal care, and you will have a fence quite as soon, and more impenetrable.

Mr. Quincy's reserve of plants should be strictly attended to. I can say, from repeated experience, that it is scarcely possible to fill up the missing places, in old hedges, with young quicks, or indeed with any.

Every spring the hedge should be examined, and the vacancies made good with well rooted quicks, rather larger than those in the hedge.

I am, dear sir,
your obedient servant,
T. M. Forman.

Hon. William Tilghman.
Vice President Philad. Agric. Soc.

The foregoing calculations are, no doubt, correct; and encourage the substitution of *live* for *dead* fences. *Protecting fences* must, however, be taken into the account, in all calculations on the expense of *plain* hedging. The mound and ditch, with the stone facing, as before described, pages 9, 11, & seq. supersede the necessity of protecting fences. But stone must be at hand; and in plenty.

To understand the objects of the writer of this communication, Mr. Quincy's mode of cultivating the thorn should be examined. His method is common, in plain hedging, for the most part. He ploughs the site of the hedge four feet wide, manures and prepares it, precisely as if for Indian corn. He *spades* the centre, two feet wide; and in this he sets his plants, eight inches apart;—near enough, as Mr. Q. observes, "in a country where *hogs* are not permitted to run at large." He advises to plough six feet wide; and plant the *whole course*, one year, in potatoes; (as it would seem) precedently to setting the thorn plants. After this, *the sides* are to be planted with potatoes, for six years. The manure forwards the growth, and the culture of the crop promotes the cleanliness of the hedge. At the end of this period it is perfect; and capable of resisting any cattle. To fill vacancies, he selects plants (out of a nursery,) "thriving a little better than those in the hedge course." His calculation on all expense, for six years, is, on a detailed cost, "*less than sixty six cents a rod.*"—A very encouraging example. See Massachusetts Agricultural Repository. No. 1, Vol. 3, p. 27, & seq.

It is to be observed; that one should know the prices of labour in each section of our country, when comparative calculations are made.

Mr. *Quincy* has been, for some time past, in a laudable course of improvement in hedging. He has conquered, by actual and visible evidence, the prejudices of the farmers of his neighbourhood. Several mean to follow his example. Stone fences are common in New England; and their necessities and the over abundance of the material, have rivetted the prejudices of the farmers in favour of this mode of enclosure. But on Mr. Q.'s farm, there are no stones. He has no fear of hogs, for the reason he assigns. He is beginning a plan of *soiling* his live stock, of every species; and never permitting them to run at large. He can, therefore, dispense with the otherwise essential additions to the expenses of thorn hedges,—*protecting fences*;—which, when cattle, horses, or hogs, run at large, are as necessary, (and as expensive,) as any part, or even all, of the operation.

R. P.

On Succession of Timber, by Richard Peters, Esquire.

Read June 14, 1814.

Belmont, May 20th, 1814.

Dear Sir,

I intended to have added, by way of note to the letter of Isaac Wayne, Esquire, on timber, the following information, which I have recently received from an old and intelligent land surveyor, Mr. *Edward Ohail*, who has frequent occasions of traversing various parts of our old settlements.

On the south mountain, running through Adams, York, and part of Cumberland counties, there are several extensive places on, and skirting, that mountain, on which pine timber alone had grown. *Now*, many of the pines are standing, though dead; the whole of the living pine timber having been long banished. Among the dead pines, and generally through large spots formerly occupied by them, very flourishing chesnut is growing; and not a living pine is to be seen. The same person reminds me, that particular species of timber perishes, while on the same land, and intermixed with it, other trees continue flourishing. At this time, and for some time past, all the *pin oak* of the counties before mentioned, on light soils, is perishing, and passing away rapidly; though other timber among which it grows is in great vigour. It is a fact well known, that, generally, trees of different species, on the same acre or spot, flourish better than all of one kind. To this, resinous timber may be an exception. The perishing of one species, whilst other kinds remain vigorous, encourages the idea of specific pabulum; i. e.

each sort has a peculiar attraction for its own specific nourishment. If this could be established, it might account for the whole of one species failing, because its supplies of peculiar nourishment were exhausted; whilst that for other kinds either contemporaneously existing, or succeeding, remained in abundance; for the support of the species to which it is appropriate. On this theory, I give no opinion. The facts are indubitable; whilst the cause remains hidden.

The same informant told me that he had evidence of the fact stated in our present volume, of the superior duration of reversed timber used for posts. It was to me singular, that he assigned the same reason for his belief in the cause, which I have long entertained; —to wit,—the impracticability of the circulation of moisture, in the reversed vessels of the timber.

He mentions a fact I have often heard. Take a piece of hiccory, cut when the sap is in full flow; and lean it against the most flourishing pine. The worms bred in the hiccory sap wood, will pass into the pine, and inevitably destroy it.

There is a certain stage of the growth of hiccory, when it is very durable for fences and other uses. I do not know exactly when it should be felled for such purposes; but I have understood, that it is best cut when the sap is flowing: (see page 110) contrary to what I have observed as to all other timber. I have never used hiccory, exposed to the weather, for purposes in which duration was essential. Your obedient servant,

RICHARD PETERS.

DR. JAMES MEASE.
Secretary of the Philad. Agric. Soc.

On Ducket's Skim Coulter Plough, by Richard Peters, Esquire.

Read June 14, 1814.

Belmont, May 23d, 1814.

Sir,

The enclosed draft of DUCKET'S SKIM COULTER, I think well worthy of insertion, either in our memoirs, or the selections annexed to them. Mr. *Ducket* was a distinguished *sand*-farmer. He is highly eulogized by *Arthur Young*, and is one of the "three CELEBRATED BRITISH FARMERS," whose HUSBANDRY afforded the subjects of Mr. *Young's* lecture, read to the Board of Agriculture, June 6, 1811. Mr. *Ducket* is much praised for the whole of his agricultural operations; and, no doubt, deservedly. He had Mr. *Young's* approbation, peculiarly, for his use of *long or fresh dung*, in preference to that *rotted*. He, with a Mr. *Arbuthnot*, also mentioned in the same lecture, always ploughed, or trenched, *deeply* for "*depositing manure, without any apprehension of losing it.*" If the practice of using long and fresh dung should be extensively introduced here, I believe nothing will ensure its success, and guard against the ardent heats of our climate, so effectually, as trenching it in with the *trench plough*; or using the *skim coulter* described and shown in the plate. Whatever may be my opinion on the subject, I think it fair and candid to render every assistance to those who are desirous of following a practice, which has in its favour the weight of such respectable authorities.

By means of this implement, Mr. *Young* had repeatedly seen, on Mr. *Ducket's* farm, stubble completely turned down; and crops of turnips, &c. instantly put in. *Weeds* were converted to manure. He "once saw him turn down a crop of *rye*, six feet high, and immediately roll in turnip seed. Not an atom of the rye [green] was visible, though the depth of ploughing was only eight inches." *Long dung*, he says, has been ploughed in, by other farmers, twelve inches deep. I copy what Mr. *Young* has published relative to Mr. *Ducket's* practice, many years ago; and repeated in this lecture. But Mr. *Young's long dung*, is not the straw and unfermented mass, applied by hot and fresh muck-farmers.

"Dependent on the *trench plough*, is Mr. Ducket's "system of *dunging;* he conceives, and I apprehend "very justly, that the more dunghills are stirred and "turned over,* and rotted, the more of their virtue is

* Dung in tight pens, or covered stercoraries, is never "*stirred or turned*," necessarily. But the juices, or moisture, are preserved from evaporation, the drainings returned on the heap, and "*their virtue*" preserved; instead of being "*lost.*" R. P.

I take this opportunity of mentioning, that I have recently received a letter from *J. Quincy*, Esq. which completes the requisite information as to his STERCORARY. It shews, that the only objection to covered stercoraries is irrefragably obviated by irrigation. A neighbour of mine, who spares no necessary cost or pains, built a hay-house over an excellent *stercorary;* made according to the plan suggested by me, in our first volume. His dung became *fire-fanged*, or dry rotten; and he abandoned all use of the stercorary, for his manure. I was certain that he did not irrigate the muck sufficiently. He depended only on accidental wetting, by rain through spouts. I am in great hopes that he will resume the use of his stercorary, for its wonted purpose when he reads Mr. *Quincy's* account of his success. I am persuaded Mr. *Quincy* will not deem it necessary, hereafter, to throw over his muck in the stercorary. Or, at least, that he will try some thrown over, and some not; for comparison.

"lost. It is not a question of *straw merely wetted;* "but *good long dung* he esteems much more than *that* "quantity of short dung, which time will convert the "former to. Two loads of *long*, may become one of "*short;* but the two are much more valuable than the "one. *Without the* TRENCHING PLOUGH, *however*, "*his opinion would be different.* If long dung is *plough*-"*ed in, in the common manner, with lumps and bundles* "*sticking out at many places along every furrow*, which

Extract from Mr. Quincy's Letter.

June 1, 1814.

"As to the STERCORARY, I can now affirm, from a most perfect "experiment, that, in the mode I have managed it, the inconveni-"encies arising from keeping the manure in a cellar, or pit, and "stated in your Memoirs, are wholly obviated. I have carted out, "this year, between *three and four hundred tons;* and there was "not one spade full dry rotted, or burnt; but the whole mass was "in as perfect a state, as could be wished. At least, so my work-"men assured me.—As to that part which lay in the centre of the "heap, *and in the vicinity of the well*, my principal farmer, a man "of great judgment and experience,—said that he never saw any "thing like it;—that *one* load was worth *four* of the ordinary ma-"nure made on the farm.—The repeated irrigation of the heap, has "a tendency to circulate all its richness through every part. But "in the winter, when this process of irrigation is supended, the par-"ticles settle; and make the central mass extremely powerful."

R. P.

"lets the sun and air into the rest, that *seems* covered; "he thinks, that so used, *it is mostly lost, or given to "the winds.* In such a case, *short rotted manure will "be better, covered; and should be preferred;* but with "his plough, nothing of this happens; and it enables "him to use his dung in such a state as gives him a "large quantity, instead of a small one."

With the opportunity, thus afforded, of viewing both sides of a question of no small import to them, farmers can judge for themselves; and test, by experiment, which practice is the most profitable in result; under the circumstances of climate and situation in which *we* are placed. If they prefer the use of long and fresh dung, let them pursue the only mode which is deemed effectual, by the most exemplary advocates of this practice.* Yet, I must add, that I have trenched in *long dung*, sufficiently deep; and nevertheless, it has become burnt, or *fire-fanged*, in a dry season.

Your obedient servant,

RICHARD PETERS.

DR. JAMES MEASE.
Secretary of the Philad. Agric. Soc.

* I have known garden-beds rendered *dung-sick*, (as it is called,) by too frequent application of muck, dug in. It seems, this is not uncommon. For, in our appendix, will be seen, a mode of recovery of such feculated grounds,* by manuring them with an *alkali*, to correct the injurious effects of the muck, or dung. An interesting account is there given of BARILLA, (carbonate of *soda*) used as a manure. This is the most powerful ALKALI.—"It is produced by the incineration of different dried sea plants, in pits like lime kilns, or those for charring wood or coal, chiefly in *Spain* and *Italy*;

* See pages 234, 5.

where whole fields (often their wheat fields) are sowed with them to good advantage. From this impure and mixed mass of cinders, is obtained the *marine or mineral, alkali.*" There are materials sufficient in our country, for preparing this substance. *Ashes*, of wood, or any vegetable, may be substituted; to cleanse or recover over dunged grounds. But the ashes are good or bad, according to the greater or less quantity of *alkali* found in them. It would seem, that ground requires a change of *manure*, as well as of *crop*. See Vol. II. "*on plaster of Paris.*" page 46.

Carbon is the basis of dung. *Oil* is an ingredient in manure; and the fattest animals are said to yield the richest, i. e. the most oleaginous, dung. It is probable, that when land has been overcharged with the dung of animals, applied for a succession of years, the residuum has been *carbon* insoluble in water, (the vehicle of the food of plants,) and perhaps, an overabundance of *oils*,—which are found in the composition of both plants and animals. The use of *alkalies* may be, to produce, from the materials deposited in this over-dunged soil, a SOAP; which, being soluble in, and miscible with, water, enters into the vessels of plants thereafter cultivated. Thus furnishing, or elaborating, their food,—whatever *that* may be;—and thereby giving salutary activity, to an otherwise pernicious and unwholesome mass.—See *Hornby's* Dissertation on LIME; *London*, 1814, p. 27.

It is reasonable to believe the allegation,* that *soaper's ashes* are only valuable for the *alkali* contained in them. According to the relations of those who have analysed them, in *England*, the quantity of *alkali* in a ton of *such* ashes, never exceeds ten; and seldom amounts to above four or five pounds. It is evident, then, that the greatest proportion is worse than useless; because it encumbers the ground, and adds greatly to the expense of applying it. What proportion of *alkali* may be contained in a ton of our *wood-ashes*, either live or spent, I do not know. R. P.

The quantity of potash yielded by different vegetables and trees, varies very considerably. A manufacturer at the Saratoga springs,

* See Appendix.

New York, informed me, in 1812, that 400 bushels of the ashes of the water ash, black ash, and elm, yielded one ton of salts.

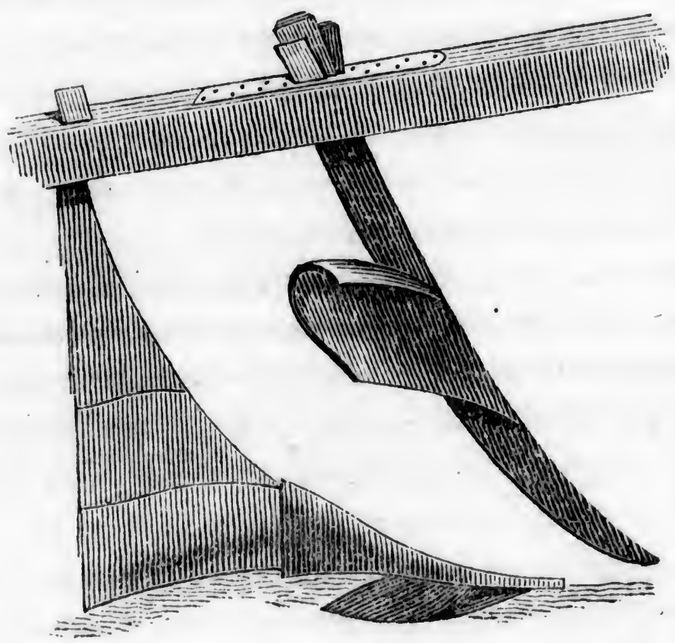
At Chazy, on lake Champlain, near the Canada line, Mr. Lambert states that the following proportions between ashes and potash are found.

1000	pounds of	oak ashes	will make	111	pounds of potash.
1000	do.	hiccory, -	180	do.	do.
1000	do.	beech, -	219	do.	do.
1000	do.	elm, - -	166	do.	do.
1000	do.	maple, -	110	do.	do.

The management of the fire influences the product. Labour is well paid with 700 pounds of potash from 400 bushels of ashes. The harder and better woods afford the most alkali.—Travels in Lower Canada, and the United States, vol. 3. p. 500. Lond. 1810.

J. M.

Ducket's Skim Coulter Plough.



On Scalded Cream, Communicated by a Correspondent, to Dr. Robert H. Rose of Susquehanna County, Pennsylvania, and by him to the Society.

Read June 14, 1814.

London, January 1, 1812.

In passing through some of the southern counties of England, a few weeks since, I was so struck, and so much pleased with the superior excellence of the *cream* which was offered me, that I enquired particularly into the manner of forming it, and have written this letter almost expressly with a view to make known to my country-women what I conceive to be one of the chef d'ouvres of the dairy.

This cream is peculiar to the counties of Somerset, Cornwall, and Devon. Attempts to form it in other parts of Great Britain have been hitherto unsuccessful. When brought upon the table it has the consistence of jelly, and is often spread upon bread instead of butter, salt being sprinkled over it.

The milk when twenty-four hours from the cow, is put into a kettle over a slow fire. The fire should be hot enough to bring it *very near* the boiling point in about two hours, and not less. A person (in England usually a child) is set to watch it. The moment a bubble rises to the top, formed by the vaporised milk, the whole is taken off and set to rest twenty-four hours more. At the end of this time if the quantity of milk be considerable, the cream will be an inch or more thick on the surface. It is now divided with a knife

into squares of a convenient size, and removed. The milk that remains after the cream is taken off, contains little beside the watery particles in its original composition. The cream is excellent for use with coffee, but when put into tea it injures its taste by being instantly converted in part into butter, which rises to the surface. A few strokes of the churn will form it into excellent butter. It is not uncommon to see the cream brought upon the table, and butter made for the use of the company by one young lady, while another is preparing the tea or coffee. Salt is added by every one according to his liking.

A month or two past, I saw a Devonshire girl making butter in this way. She put about a half a pint of cream into a bowl, and stirring it with a spoon made butter, (she said half a pound) in two or three minutes.

The dairy women say that milk treated in the mode I have mentioned will yield one fourth more butter than in that commonly in use in England and America.

The cream will keep sweet somewhat longer than common cream. It is often sent to London in the winter, more than two hundred miles, and is considered a great treat. Mr. Stephens, when he is in town in the winter season, receives his supplies of it regularly, by mail, from Treguna Castle, which is very near Land's End, and more than 90 miles distant.

Mr. Marshall notices the practice of scalding the cream in West Devonshire. He says, that the vessel

containing the milk is put "over the wood embers of the ordinary hearth; but sometimes over charcoal in stoves fitted up for that purpose; and remains in that situation until it approaches *nearly* to boiling heat: the proper degree of heat being indicated by pimples or blisters that rise on the surface of the cream. The smallest degree of ebullition mars the process." He adds, however, that butter made "from scalded cream has frequently a smoky flavour, and wants the even wax-like texture observable in well manufactured butter." Marshall's West of England, vol. 1, p. 253. London 1796. The practice of scalding cream is well known in some parts of the United States. J. M.

On the Disease in Wheat, mentioned in the Agricultural Memoirs, vol. 1. *By James Mease, M. D.*

Read, June 14, 1814.

In the first volume of the Memoirs of our society, p. 124, &c. two letters were published on a new disease in wheat, that within the last seven years has appeared in the state of Maryland, near Elkton; and I am very sorry to learn that it not only continues, but appears to increase. Some roots of this diseased wheat have been sent to me, by John R. Evans, Esq. of Elkton, within a few weeks, in which however no insect, or any other cause is discoverable either by the naked eye or glasses, to which the stinted appearance of the wheat can be justly attributed. The leaves of the stalks sent are not more than two inches and a half in length, and many of them are dead: in several roots no more than six leaves are green. In a letter accompanying these roots Mr. Evans says, "in those parts of the field that show the disease in March, the wheat dries up, and leaves the ground at this season (May 4th,) quite bare, but if attacked in April, will remain on the ground until the healthy wheat ripens, and is cut, without any apparent change from the branches I now send you; if the attack is later, say about the 10th of May, it will sometimes make stalks about a foot long, with very short heads without wheat, or very few grains in them.

"I have looked in vain for the cause; and especially for insects, for five years past, and have tried a number of preparations of the land without effect, and last year I limed the ground before my spring crop, on

which I collected the wheat I send you: my wheat is not much injured this spring, but some of my neighbours have suffered more than usual. The disease increases on the land that was Z. Hollingsworth's, on which I am told the whole crop is destroyed.—I yesterday saw a highly manured field about two miles from me, the property of Mrs. Gilpin, and at least one third of it is destroyed: in many places the land is as bare as the public road. I have not seen any field in my vicinity, but what is somewhat injured. I have no doubt of the disease being also in the wheat near Philadelphia.—I saw it in the wheat near Lancaster, in June, 1807."

The most likely means to remedy the evil are the following.

1. Attention to the stable manure put on the land intended for wheat.
2. Attention to the time of liming the land.
3. Paring and burning the injured spots.

One of the best papers ever written on manures in general, is by the late Robert Somerville, of Haddington, and was drawn up for the consideration of the British Board of Agriculture: and as nothing in the whole round of agricultural operations is of more importance than the right management of manure, and few are so little understood, I have thought it would be rendering a service to the agricultural interest to insert an extract from the paper of Mr. Somerville, in the appendix. It is more than probable that the disease in the wheat proceeds from very minute insects bred in the manure, and that a right management of it will tend to destroy or to lessen their number.

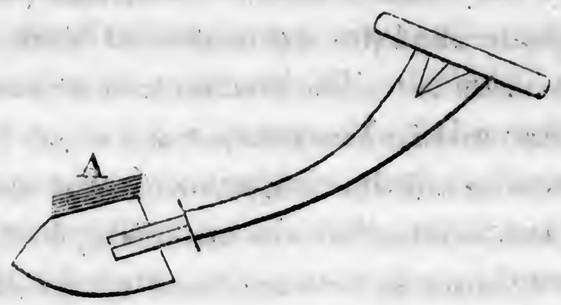
2. It is a common practice of our farmers in Pennsylvania to haul lime in the autumn, on the field on which it is to be spread the following spring, and to cover the heaps with earth until it is wanted, (by which time it will be fully slaked) and then to spread it on the field. Oats are very commonly sown after it, in which case wheat is invariably put in, the same year. If oats are not sown, Indian corn is planted, and the crop being gathered, the field remains idle until the next year, when oats are sown; or if the land be strong enough, barley is put in. In some cases, the stalks of Indian corn are cut off early, that is before the ears are quite hard or dry, and set up in bundles against the fence in the field, where they remain until they are fully ripened and hardened from the sap remaining in the stalks, and from exposure to the weather. But the practice of sowing wheat on land limed the same year has been so uniformly found to injure the crop, that it should no longer be followed. This subject having been already discussed by the president of the society, no remarks are now requisite on it. See Memoirs, vol. 2d, p. 279.*

3. The practice of *paring* and *burning land*, is scarcely known in the United States, although a favourite practice in England; where it frequently is adopted for the purpose of quickly destroying the matted roots

* For rye, the practice of liming the land the same season answers admirably, but the lime should be hauled in the spring or early in the summer, and mixed with the rich earth from a head land or hedge row, grubbed and ploughed up. Clover sown early in the following spring, on rye thus manured, thrives luxuriantly.

of sour grass. The implement used to pare the surface of the soil, is a *breast plough*, a cut of which is annexed.*

The implement "is called a breast plough, from the manner of using it, being pushed with the breast, by the man who pares the land.



"At A there is a a small edge turned up, that cuts the furrow or paring from the rest of the sward, by means of which when the paring is cut of a proper length, it is turned over with the cutting iron." Communications to the Board of Agriculture, London, vol. 2d, page 73.†

P. S. When the foregoing paper was read in the society, Mr. Miers Fisher of Philadelphia County,

* Breast ploughs may be purchased at B. M'Mahon's seed and nursery store, South Second Street, Philadelphia.

There are *paring ploughs*, calculated for extensive operations in paring and burning, (called DENSHIRING,) drawn by horses.

† After the sods are pared off, and dried, they are to be put up in small heaps, and burnt. The ashes may be spread thin on the surface of the soil, either of the field that has been pared, or on a grass lot or corn field. Care must be taken to clear well from under the heap, to prevent too great a luxuriance of the succeeding crop.

stated that the late Samuel Chew, Esq. of Chester town, Maryland, informed him, about 10 years since, that he had lost upwards of 1000 bushels of wheat by the disease described. Mr. Chew mentioned the same fact to the president of the agricultural society; and Mr. Fisher found a spot in a field near him, which was affected by the same disease. The wheat was about a foot high, and had the appearance of heads, but without grains in them. The disease now exists in the vicinity of Snow Hill, Maryland.

From the fact of the sickly wheat, only appearing in spots in the fields, there is a greater probability that by the use of proper means, the cause of it may be removed; and the evil is so alarming that the farmers should lose no time in attending to every hint that is offered to remedy it.

A fourth remedy, for the disease in question, is the sowing spring or summer wheat.

There are several varieties of this wheat, some of which have been tried in England and found not to answer. In Canada a kind is cultivated with success; and in 1812, I saw at Burlington, Vermont, a very fine sample of it, that had been raised in the vicinity; the seed of which had been obtained from Montreal. In fields, therefore, which have been sown with winter grain, and destroyed by the disease under consideration, the deficiency may be supplied by spring wheat.*

* See the Appendix for observations on the culture of spring wheat.

Facts relative to the Preparation of a dry Leaven or Yeast, for making good Bread. Communicated to James Mease, M. D. by Samuel L. Mitchill, M. D. of New-York, Honorary Member of the Philadelphia Society for promoting Agriculture; in a Letter dated June 1st, 1814.

Read June 14, 1814.

One of the important improvements in the economical arts, is the preparation of bread from seeds or grain. A further convenience in the manufacture of this article, is the extrication of air through the dough or paste of which it is made, to puff it up. This constitutes the chief difference between leavened and unleavened bread.

Leaven is a material or mixture, which on being kneaded with meal or flour, and exposed for some time to a convenient warmth, undergoes fermentation and produces carbonic acid gas. This aerial product fills the soft and plastic mass with bubbles, dilates it into cells, and imparts to it the quality of sponginess so much approved. The leaven itself is a raised portion of a former batch, reserved for the next occasion. It is rendered fit for elevating a new mass of dough, by incorporation with water, wort, or some other fermentable liquid, capable of increasing its intestine action. And the product of leaven thus mingled with water or wort, is a foaming compound called *emptyings*. Experience has shewn that leaven and emptyings, are liable to sourness, moulding, and spoiling: and when

the stock is exhausted it is very troublesome to recommence the operation.

A substitute is found in barm or yeast. This is the froth or scum that rises during the fermentation of malt-liquor. It consists of a portion of the farinaceous matter of the malt, associated with an abundance of fixed air. This latter answers the purpose of imparting to dough, an approved degree of lightness; but can be procured by none but those who dwell in the neighbourhood of breweries, and that only during the cooler season of the year while the vats are working.

Another method of raising the dough is by the addition of carbonated potash. A small quantity of this alkaline ley, mingled with the paste, assists in the enlargement of its volume. It is employed by the housewives of Long-Island, in preparing an extemporaneous cake, called *potashed cake*, which, when properly managed, is palatable and excellent. The heat of the oven, probably separates carbonic acid gas enough for this effect. But the quantity is insufficient to make bread of the first rate. Its agency therefore is much limited.

Of those three materials, the two former are subject to the inconvenience of souring, spoiling, running out, or failing. This is owing principally to their *moisture*. In leaven, a fermentation must be excited for the purpose of producing fixed air; while in yeast the air is the product of a previous fermentation. It has therefore, for a long time been the object of particular desire, to possess a *dry* composition that would readily yield a sufficiency of gas for preparing good bread.

Neither potash nor pearlash corresponded fully with

this character. They usually attracted water from the atmosphere, and became liquid. This was no objection. But the scantiness of the gas extricated during the baking-process, was an objection, where the alkali was small in quantity; and its disagreeable taste was an additional objection, where the quantity was large.

Under such circumstances, it was expected that science would step forward, to the relief of the domestic arts. From chemistry, more especially, some nice and well-adapted project was confidently hoped. To men of learning and experiment, the followers of the trades and arts looked for a *dry* and *portable* substance, that should quickly be capable, like leaven and yeast, of yielding a plenty of carbonic acid.

But while the wise and enlightened were pondering upon the subject, under an utter inability to direct how the thing ought to be done, a series of fortunate accidents led to the discovery of a leaven or yeast durable to keep, and ready to ferment.

This composition became known to the New-Yorkers, in the first instance, through the emigrants from the eastern states. Some of these persons who laboured on the turnpike roads, in Orange county, were observed to possess an efficacious method of preparing their own bread, by means of mealy lumps or pallets of dough, dried to hardness. These they carried with them in a bag or box. With the single precaution of guarding against humidity, these sons of toil and thrift, could preserve their stock of dried yeast, for an indefinite time. It was found by the neighbouring inhabitants, to be so valuable, that they too learned the art of manufacturing an article, called since by them, in

commemoration of the way by which they procured it, *Turnpike* leaven.

The preparation is plain and easy. For getting it from the raw materials, they make a fermenting mixture from a strong decoction of hop-blossoms, thickened with flour of wheat or rye. This they set in a convenient vessel and temperature for the intestine action. When the operation is at its height, and the mixture brisk with froth and bubbles, flour of maize, (Indian meal,) is stirred into it, until the whole becomes thick and stiff. Immediately, it is taken out of the vessel, moulded into pieces of the size of a finger or less, and dried in the sunshine. When properly freed from humidity, it is put away for use.

The employment of it, is likewise ready and convenient. By infusing and stirring a few ounces of the *turnpike* yeast into a pint or more of warm water, a fermentation soon commences. This may be aided by the admixture of a little wheaten or rye flour. In a moderate time, the duration, for example, from bed time until the ensuing morn, the fixed air will be sufficiently extricated; and on being incorporated with the meal by kneading, will raise it quickly into excellent dough for bread. A more expeditious way than this is practiced, by incorporating the mixture of the leaven and water, with the flour into paste; without taking the time and trouble of exciting fermentation. The exposure of the dough to the requisite warmth in the kitchen or chimney corner, will promote the working directly.

Nor is the renewal difficult. For when the quantity of dry yeast is nearly consumed, and a fresh supply desired, it may be renewed by adding some of the remaining dry yeast to hop-water, and promoting their fermentative action by a due application of warmth. When the carbonic acid gas shall be in free evolution, the action is retarded by adding Indian corn meal to stiffness, as before; and afterwards stopped, by drying the lumps and morsels of it, in the solar rays. Such is the history of this economical composition, whose inventor is unknown. By a succession of lucky expedients, the result has probably been attained here, as in various other cases, by persons who possessed the capacities of artists, and the faculties of observers, without the accomplishments of philosophers. It is nevertheless, the true business of philosophy to draw important facts from obscurity, to state them fairly for consideration, and to display the usefulness of their applications. In the present instance, science may contemplate with satisfaction, the formation, the suspension, and the renewal of fermentative motion, in a class of substances intimately connected with the comfort of social and civilized man.

On the Cultivation of the BARILLA *Plants in the United States; by Joseph Corrèa de Serra, F. R. S. Honorary Member of the Philadelphia Society for promoting Agriculture.*

Read June 14, 1814.

Philadelphia May 23, 1814.

Sir,

Considering on the subject of our last conversation, I am come to the persuasion, that this is the proper epoch for introducing the cultivation of Barilla in the United States. You are arrived at the period of being no more a merely agricultural nation, possessing only the most necessary arts. Circumstances, and the enterprising spirit of your people, have thrown the nation in the manufacturing career. Glass houses have already been successfully established in many parts, and more will undoubtedly be established. The barilla, you could before this, cultivate only for exportation, and you had more important articles to attend to; but now its importation from Europe would be required, and its price, enhanced by freights, expenses, merchant's profits, &c. would be an obstacle to the arts to which it is necessary, and embarrass, at least, their progress amongst you. This culture I have from observation, the certainty will be successful in your country, since the most valuable of the different plants from which the carbonate of soda is extracted, grow spontaneously in the territory of the United States. The *salsola kali* I have found without any particular research, in the island of New York, towards the East river, very near the city; in Boston near Dorchester, at the end of South Boston Bridge, and what surprised me, at Falmouth on the Rappahannock opposite Fredericksburgh, and at Ricket's near Richmond, both places very remote from the sea. This makes me believe that this useful plant may enrich the bad sandy soil as far as the head of tide in your rivers, which is not the case in Europe, where it is generally found near the sea shores. The *salsola salsa*, another of the barilla plants, I have observed in Boston neck, covering the low grounds inundated by the tide. The *salicornia fruticosa*, which is one of the materials of the fine Alicant barilla, grows in almost all your salt marshes, and your sea shores present quantities of different species of *fucus*, which are in Europe employed to the same use.

The salsola kali would be to the owners of your sandy soils near the shore, an object of profit, with the labour only of sowing it on such grounds, and cutting and burning it in proper time. A little printed instruction on this subject would excite their attention first; but more is to be expected, if together with this, they can witness the success of some practical example.

At Rome and its neighbourhood, and in several parts of Turkey, they cultivate a superior species of barilla plant, the *salsola sativa* of the botanists. This crop alternates very profitably with the wheat and barley crops.* The Roman name of the plant is *riscoli*.

* In some cases the seeds are sown with the barley crops. After the barley is reaped, the barilla plants occupy the ground. J. M.

It would be worth while to introduce the culture of this plant into the United States, and to procure from Rome not only the seed, but practical details about its culture and profits, in order that the first trials that should be here made of it, may have no chance of miscarriage. It is a general effect of an unsuccessful attempt at any new thing, let it be ever so useful, to retard for a long while its introduction.

JOSEPH CORREA DE SERRA.

HON. RICHARD PETERS, ESQ.

NOTE.

I have been informed, that, in Rhode Island, they use the sea weeds, with great success, on their lands. Commonly as green manures, often dried and burnt. No doubt the *soda* or *mineral alkali*, in these plants is the operative principle: though, in addition, the putrified vegetable is highly efficacious. The *soda* exists in salt sedge, or marsh grass, much employed on the coasts or shores of New Jersey; either as a top dressing, or ploughed in. It would be well to gain information respecting this mode of applying the weeds or plants. Possibly extracting the *alkali*, when it is known that *barilla* plants are in plenty, may become a business highly conducive to the interests both of agriculture and manufactures. R. P.

On the engrafting the Chesnut Tree. By James Mease, M. D.

Read June 14, 1814.

The fruit of the chesnut tree of North America is in general, not above half the size of the Spanish chesnut. But it makes up for its comparatively diminutive size, by superior sweetness. I have, however, seen a variety of the chesnut brought to our market, which was nearly of the size of the European species, and as the propagation of such a variety is of importance, I think it will be rendering a service to our farmers to point out a sure and easy mode of effecting so desirable an object.

If a young farmer would inclose ten acres of land the first year of his farming life, plant them in chesnuts, and engraft them when of a proper age from a tree bearing large chesnuts, I venture to predict that at the end of 20 years he will have secured to himself a greater revenue, than if the same land had been kept in the alternate husbandry of our country.

When in flower, the chesnut tree is highly ornamental; and no article raised by a farmer would command a better price in foreign parts, than its fruit. The Spanish and French chesnuts are exported to all the world, besides constituting the substantial part of the diet of the peasantry, to whom they are as essential as the potatoe to the generous sons of Ireland. Horses are also fed on chesnuts in those countries; and the Portuguese hams, which are very much admired, derive their excellent flavour and fatness

from the hogs feeding in extensive forests of chesnut trees. This fact was communicated to me by a gentleman who resided eleven years in Portugal.

The method of engrafting chesnuts, to which I allude, is translated from the "Cours Complet d'Agriculture," by Rosier.*

I do not find this mode of engrafting noticed by such late American or English writers on gardening as I have seen. Michaux notices it in his elegant and useful work, on the forest trees of the United States, article "*Castanea vesca.*"

On Grafting, by Juxta Position; otherwise called Flute, Pipe, Cannon, Whistle, Shank, or Ring Grafting.

"Although all grafting is by juxta position, yet this expression applies more particularly to that now under consideration; because it is indispensable that all the parts touch as close as possible, and that a just proportion be preserved between the grafting piece, and the subject to be grafted.

A branch must be selected, sound, and of the growth of the preceding year, when possible, and while the sap is running; this must be cut off some inches near the trunk, or farther off, according to its strength or size.

The annexed cut represents a piece of a branch separated; but we must suppose it attached to the trunk. From the point A, to the point B, the bark is to

* Vol. 5, p. 324. Paris 1793.

be slit in strips by the edge of a pruning knife; and these strips are to be gently detached from the wood, without bruising them, as is seen at E.

While an assistant is engaged in this operation, another prepares a cylinder or tube, C, having a bud D, or several buds, and of equal diameter, to that of the wood A, when barked. Then without loss of time it is to be slid upon the wood, until its lower extremity touches the basis of the strips: if the cylinder, applied to the wood, is proportioned to it, and if it covers all the wood, and unites exactly with it; the strips are to be cut off below the cylinder, by a circular cut, and after having made the two barks join, the united parts are to be covered with the ointment of St. Fiacre.*

* The ointment of St. Fiacre (the patron of gardeners) is a mixture of cow dung and clay. The object being merely to cause the just approximation of the edges of the bark, and to defend them from the air and rain, any adhesive plaster will answer the purpose. A mixture of turpentine, wax and resin spread on thin leather, would probably answer better, not being liable to contract and fall off by heat, or to be washed off by rain.

Another and a surer mode consists in preserving the strips, and covering the cylinder with them, except the bud or eye, and to retain them by means of bandages, which may afterwards be easily detached when required.

When it is difficult to find a branch, the bark of which will fit exactly the branch which is cut in strips, the following expedient must be adopted. If it is too narrow, a branch must be slit longitudinally on the side opposite to the bud, and the cylinder being taken off, is to be applied to the wood. Then a part of a strip is to be raised that corresponds to the deficiency in the cylinder, and must be divided in its whole length, of a breadth wanting in the ring, so that this division fills the vacant space: finally, we raise up and surround it all around with the strips, as has already been directed.

If the bark cylinder is too large, we cut it to the diameter of the wood; then fit the edges, as nearly as possible, and cover them with the strips."

Mr. Thomas A. Knight says that "the Spanish chesnut succeeds readily when grafted in almost any of the usual ways, and when the grafts are taken from bearing branches, the young trees afford blossoms in the succeeding year."* I entertain no doubt of the same observation applying to our American chesnut.

Those who may wish to plant chesnuts on a large scale, or to raise nurseries of the trees, ought to take the precaution of planting the nuts in the burs, for the field mice will certainly destroy them if the bare nuts be planted.

* Trans. Horticultural Soc. London, vol. 1, p. 62.

Additional Observations on trimming Hedges; on the Vegetation of the Haws; and the injurious Effects of the Walnut and Cedar Tree on them. By James Mease, M. D.

Read July 12, 1814.

In pages 15, and 382, it is stated that Mr. Neill injured his hedges by summer trimming, but their age was not mentioned. "At the time they were trimmed they were three years old, and were cut down to 12 or 14 inches. The following year, he says, they kept alive and but little more: this year, (1813) they show more vigour, and he thinks that in another year they will send out well."

The haws of the Washington thorn (*Cratægus cordata,*) require to be buried one winter before they sprout, and they should be put into the ground the same autumn they are taken off the tree; the pulp surrounding the stones having been previously rubbed off, and the stones washed. The usual way is to put them in a box of sand, and to stand it under the eaves of a house, to receive the dropping of water from it, and by the spring they will be open and ready for planting. But Mr. Caleb Kirk of Brandywine tried with success a more expeditious way, viz. immersing the stones, previously rubbed and washed, in hot water to swell them, then exposing them to the air, at night, to freeze the water in which they were immersed, and afterwards thawing them in the sun, repeating this process for four or five days, when he found them open and fit for planting. He tried this ex-

periment even so late as the first of March, with success. The haws will not vegetate, if sent to any distance in the pulp, as Mr. Kirk knows, to his cost and disappointment. It is probable that the alternate freezing and thawing of the Newcastle thorn *(Cratægus crus galli)* will also expedite their vegetation: they require to lay in the ground two winters before they vegetate.

Mr. Kirk stated to me further what may be of great consequence to the success of a hedge, viz. the injurious effects of the common black walnut tree upon it. One of those trees that stood at the distance of 15 feet from a hedge three feet high, killed three pannel of it. Another walnut tree only three inches in diameter at the root, also killed six thorn plants, and at the above distance: both trees stood directly opposite to the hedge they blighted: on removing the walnut trees, the hedge grew well:—whereas an apple tree that shaded a part of the hedge was not found injurious to it. Cedar trees likewise are injurious to hedges, from the farina which is so abundantly discharged from them, settling on the leaves of the plants.

APPENDIX.

SELECTIONS.

*Description of a Swivel-headed Churn Staff, to facilitate the making of Butter: by Mr. Timothy Fisher, of Ormskirk, Lancashire.**

Sir,

I beg leave to lay before the Society of Arts, &c. my swivel-headed churn staff, which, on repeated trials, is now fully proved to answer the very desirable purpose of relieving the hard labour of churning; which it does in a much greater degree than could be supposed, from a slight view of its simplicity and apparent small deviation from the common churn staff. It however, passes with much more ease through the cream. It must be worked much slower than the common, otherwise it is found to churn the cream too soon, or according to the technical term in this county, *to swelt it.*

* Trans. of the Soc. of Arts, London, vol. XXVI, p. 131. Five guineas were voted to Mr. Fisher for this invention.

I have tried it in a variety of forms and sizes; with six wings the labour was less relieved; also when I gave less bevel to the ends of the wings.

When I gave more bevel it passed through without producing the intended effects. Experience therefore has convinced me, that it is best to have four wings from six to seven inches in length, from the centre, according to the size of the churn for which it is intended, from two and a half to three inches in breadth, made plane in the centre or middle, about the fourth part of their length, and then bevelled regularly off, so that the extreme point shall form an angle of about 45 degrees with the plane of the middle. The plane part acts with its usual force upon the middle of the body of the milk; and the points turning rapidly round give a kind of compound motion to the whole, and that also alternate, and yet it does not in the least splash or throw out the cream as in the common mode.

I am, Sir,

Your obedient servant,

TIMOTHY FISHER,
Gun-maker.

Thomas Ecclestone, Esq., of Scarisbrick Hall, near Ormskirk, certified, that he had seen Mr. Fisher's new method of churning butter, and that he thinks it superior to any he had heretofore known for that purpose, and that such was also the opinion of several other persons in the farming line who had witnessed its effects.

Fig. 1.

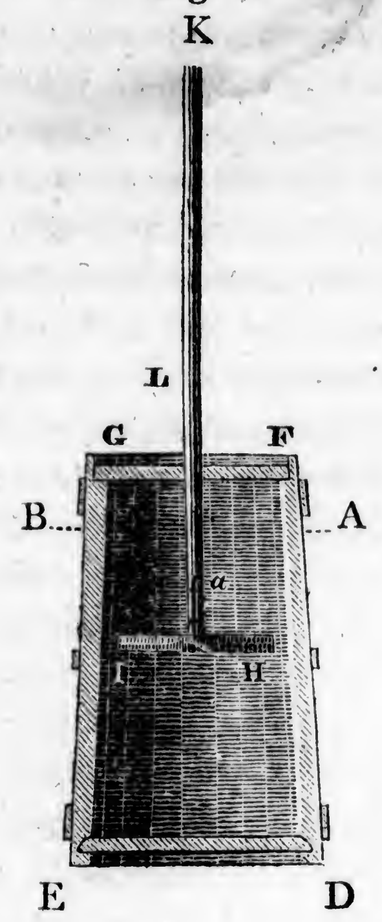


Fig. 2.

Fig. 3.

Reference to the engraving of Mr. Fisher's Churn Staff.

Fig. 1, is a section of an upright churn, in the situation it would be when at work, and figs. 2 and 3, are enlarged views of the head of the churn staff. ABDE fig. 1, is a section of the churn; FG is the lid; KL is the churn staff, and HI the wings, or beaters; it is this part only which differs from the ordinary churn; it consists of four wings or vanes MNOP, fig. 2, firmly fixed together, and turning freely on a pin driven into the end of the churn staff. The flat part of

each vane is cut, so as to be inclined to the plane in which all four lie, in the same manner as the sails of a windmill, as is well explained by figs. 2 and 3. When the beater is moved up and down through the cream, its action upon the oblique vanes causes it to turn round upon a pin above mentioned, as a centre. *a*, Fig. 1, is a small wooden bolt sliding in a groove made in the churn staff, KL; its end shuts into a hole *b*, fig. 2, made in one of the vanes; when this bolt is pushed down, it prevents the vanes from turning round, for the purpose of collecting the butter together at the top of the butter-milk when the churning is done.

Extract from a Dissertation on the Natural History and medical effects of the Secale Cornutum, or Ergot, by Oliver Prescott, A. M.*

This production is generated by a peculiar disease, which occasionally affects the grains of rye, and is one of the four diseases of plants enumerated by Linnæus, and by him denominated *clavus;* some naturalists call it *clavus secalinus* or *mater secalis*, others *secale cornutum*, and *secale luxurians*. The French term this production *bled cornu*, *seigle ergote*, or *ergot*. This disease very often attacks the rye in France. In the province of Salonia, [Sologne] more especially, it is very predominant; and in such seasons as are very moist, is occasionally seen in Great Britain and other parts of Europe. The rye in this country also, is so liable to the same disease, that in our new settlements, there is always, I believe, more or less of it to be found in this grain; but is more rarely to be discovered on fields that have been kept in a state of constant cultivation, for a considerable number of years; as those in the vicinity of Boston, and other towns on the sea-board.

The earliest account of this diseased rye is probably that of M. Dodart in 1676; the latest I have seen is a memoir of L'abbé Tessier, read before the Royal Medical Society at Paris in 1776. To this last I am principally indebted for the following facts relative to its natural history, most of which accord with my own observations.

* Eclectic Repertory, Vol. IV, No. 2, page 249.

This diseased grain, which I shall call *ergot*, is found in the ear of the rye, in greater or less quantity, according to the season, and its situation. Its form is ordinarily crooked and long; it projects much from the *glume;* is larger in the middle than at the extremities, which are sometimes blunt, and sometimes pointed. It is seldom round in its whole length, there being generally three angles, and certain longitudinal lines, extending from one end to the other. In many grains, particularly the largest, there are small cavities, supposed by some to be occasioned by insects, by others, by the sun. Its external colour is violet of different degrees of intensity, which encloses a dull white substance of a firm consistence, from which the external coat does not separate itself even after long boiling.

A grain of ergot breaks short, like a dry almond, and has nothing disagreeable either in its odour or taste; the grains are of different size, and vary in their length. Some are less than the grains of rye themselves, while others, are eighteen or nineteen lines in length, and two or three in thickness; but the length is more usually ten or twelve lines. Sometimes they are short, and at the same time large; but these are not of an ordinary form.

When the ergot is large, there are generally but few upon an ear, and the grains of rye, on the same ear, are fine and healthy, and the whole plant vigorous; on the contrary, when the grains of ergot are small, there are many on an ear, and the stalk is less strong and thrifty. There are commonly found four or five of these grains upon one ear, frequently ten or twelve, and sometimes, even twenty. The grains of rye in

those ears which have many ergots are never good, but are shrunk, and covered at their superior extremity, with a black powder.

This production, if exposed to the air, dries readily, and becomes less in size, and very light. A measure of it, that holds fourteen pounds of rye, will weigh but nine pounds.

It is occasionally found on *wheat*, but on the ears of this grain, it is always short, though thick and well nourished; the quantity, however, produced by this plant, is very inconsiderable.

On many ears of rye, there are to be found grains composed of rye and ergot, the portion ergotted makes sometimes one half, and sometimes only one third of the grain, and is that part within the husk, while that part which is rye is most distant from the ear. These grains, if planted, will not vegetate, the germ being destroyed. Winter and spring rye are, as far as has been observed, equally liable to this disease.

Much time and attention have been devoted by different naturalists, to ascertain the cause of this production in rye. Some, from the circumstance that there is more produced in rainy seasons, and in wet grounds, have attributed its formation to the moisture of the air and the earth; others believe it to proceed from the grains having been pierced by insects; while others have regarded it as a *mole*, occasioned by a faulty fecundation. This last opinion is more probably correct, for nothing has been found to contribute so much to its production, if the soil be moist, as a storm of rain falling upon the grain when in bloom.

There will always be more of it found on the bor-

ders of fields, than in other parts, where the soil is less beaten and more mellow. The humidity being equal, those fields are most infested with it, which have been newly turned up.

The soil and climate of Sologne are so peculiarly adapted to the growth of this substance, that it is said to produce more of it, than all France beside; for, in some years, not less than one fourth of all the grain, raised in that province, is ergotted. In this district and its vicinity, there has, at different periods, prevailed among the peasants, a very malignant and mortal disease, which is characterized by a dry gangrene in some one of the extremities, sometimes in all of them, which has been generally ascribed to their living upon bread, made of the ergotted rye.* This bread, M. Dodart informs us, does not differ, in regard to taste, from ordinary bread; is more particularly pernicious when new; but its effects are not observed until it has been eaten a considerable time. According to the observations of M. Noel, the ergot loses its deleterious qualities altogether, after having been kept a few months in sheaf: and writers all agree in this, that the disease it is supposed to induce is prevalent only at the conclusion of harvest, and ceases entirely before the commencement of the winter.

Besides this spontaneous gangrene of the limbs, Hoffman and other writers have attributed also to its use, another species of disease, which prevailed at different periods, in various parts of Europe, attended

* For a particular account of this disease, and the method adopted for its cure, vid. Duncan's Med. Com. Vol. ix. p. 78.

by convulsions and spasmodic affections. But these are now generally considered as originating from other causes.

In France, many experiments have been made on animals, to prove its malignant effects, and numerous communications have been published, shewing its noxious properties: but I believe it has never been considered by any of these writers, as capable of subserving any medicinal or other useful purpose.

Some few empirics, however, it is said, have long known that the ergot would expedite lingering labour. But these ignorant pretenders bestow upon their nostrums so extravagant encomiums, and their impositions upon the credulity of the public are so numerous and frequent, that no credit whatever can be attached to their recommendations. Most of their mighty secrets, when disclosed, prove altogether inert; or at best very incompetent to effect the purposes for which they are intended. Their powder, to promote delivery, was consequently derided, and was thought by the faculty to be unworthy of serious attention or regard.

The first information the public received, from a source entitled to credence, that this production was, in reality, endued with such an unexampled property, was through the medium of the New York Medical Repository,* by a letter from Dr. J. Stearns to Dr. Akerly. In this communication, Dr. Stearns designates it by the appellation of *pulvis parturiens.*

* Vol. II. p. 308.

[An account of this disease in rye, is given in several foreign publications, and was noticed by M. Perrault, in the Trans. of the Royal Academy of Paris; an extract of whose paper is given in the Trans. Royal Soc. Lond. for 1676, No. 130, p. 758. In the 54th vol. of the transactions of the same society, there is an account by Mr. Tissot of the disorder produced by eating bread made of rye affected by *ergot*. It is denominated by Sauvage, *necrosis ustilaginia*. The disease termed *raphania* is thought to originate from the same cause. From the observations of Dr. Stearns of Albany, state of New York,* and Dr. Prescott, there can be no doubt of the ergot possessing very active medicinal powers.] J. M.

* Med. Repos. Vol. I. p. 308.

The following excellent directions, from THE FARMING SOCIETY OF IRELAND, *are deemed well worthy of being recommended to our sheep keepers. These directions are the results of experience in a country in which wool has become of primary importance, and receives the attention and fostering care of the first characters of the kingdom; of whom the farming society consists.*

"1*st.*—*With respect to keep.*—It is essential to the evenness and strength of the staple, that the feeding of the animal should be uniform, without any sudden interruption or transition; where that is suffered to take place, the natural progress of the wool is checked, a second growth succeeds, and the point of contact is so weak as to snap under the operation of the manufacturer, who, being aware of this disadvantage, cannot of course afford such a price for wool of this description, as he could for that of a more perfect staple:—much wool is injured in this way, between summer and winter keep, which, it is conceived, should be made to blend, as gradually as possible, that the mischief here spoken of might be prevented —what the quality of the keep should be, seems not to be of so much consequence. Merino wool, from the rich pastures of Meath and Carlow, was allowed to be as fine as any from the Wicklow mountains.—The sudden transition from rich to poor diet, or from poor to rich, appears to be the circumstance which ought to be avoided.

"In aid of both winter and summer keep, salt is made use of, by the most judicious breeders—and is recommended for a particular purpose, exclusive of its healthful tendency, viz. for training in the flock to such docility as renders either the crook or the dog, or even a second person to assist in gathering the sheep unnecessary.—The shepherd of the largest flock in Ireland always carries some salt in his pocket, of which the sheep are so particularly fond, that, when he calls to them in the field, they flock round him to lick the salt from his hand, by which means he can, without any trouble, lay hold on whatever sheep he wishes to inspect.

"2*d.*—*With respect to washing*.—Careful river washing, on the sheep's back, is that which is at present considered the most approved method—for the native sheep it is obviously sufficient, and many lots of Merino wool, treated in that way, were considered sufficiently clean—but where much dirt has fastened itself at the points of the wool, and the hardened yolk cannot be dissolved in cold water, it might be wise to have a large tub of water, at about blood heat, in which to place the sheep, till the wool shall have been well washed and softened, and that it should be river washed directly after.

"This, it is said, was the mode used by lord Bantry, not with the sheep, but with the fleeces which were produced at the Cork sale, as clean as wool imported from Spain.

"This process would not be so troublesome as might be supposed—The heat of the animal will keep nearly a sufficient warmth in the water, which will

at all events be produced, by a few pails of hot water put in occasionally—and it is worthy of remark, that the greater the number washed, the better will the water cleanse.

"Something similar to this has been communicated by an eminent authority in England, who states, that if ten flocks be washed in a clay pit of stagnant water, the last flock will come out with the cleanest wool.

"Indeed, these facts seem to be strongly corroborated by the following circumstance, viz. That clothiers who have a certain liquor in which they scour their wool, merely add to the *quantity* to supply the waste, but do not throw away the liquor itself for years, considering that it is improved, for their purpose, by repeated use.

"3*d.*—*With respect to shearing*.—It is recommended, that previous to the sheep being handed over to the shearer, a person should clip off all coarse and kempy wool from the hips, legs, pate, and forehead, and put it in a bag or a basket apart.

"This is particularly necessary to be observed in shearing of lambs; as in lambs' wool, if the coarse part and kemps be suffered to mix with the fine, they never can be sorted out, and must spoil any fabrick to which the wool is applied—the kemps will not take any dye, and whatever colour may have been intended, the article must be a mixture. Great care should be taken in shearing, not to give the wool a second cut, which wastes and injures the fleece materially.

"That lambs should be shorn is not now controverted—if the weather be fine and warm they should be shorn at the same time with the sheep, or soon

after—the wool will be shorter and fitter for hatters' use, and will be the better grown as a protection against the cold of the ensuing winter.

"Lambs wool is much injured by a pitch brand—a small paint brand is recommended, and that it should be placed on the forehead or hip, rather than the side or shoulder, which bears the finer wool.

"4*th.*—*With respect to making up.*—The fleece, when shorn, is to be spread at large, with the outside uppermost, upon a platform of boards, and is to be carefully folded and rolled, beginning at the hinder part, and folding in the sides, or belly wool, as the rolling proceeds; when arrived at the shoulders, the wool of the forepart is to be rolled back to meet the other, instead of having the binder twisted from thence in the usual manner, and the whole is to be secured by a packcord band, in the common way in which parcels are tied up.

"The fleece is by these means kept much tighter together, and unfolds itself with more regularity, under the hand of the sorter, who is otherwise much inconvenienced, by the confusion or breaking of these parts of the fleece, which are twisted together for the band, in the common method."

The following papers are taken from a newspaper, with a view to prevent their falling into obscurity; so far as we are capable of securing to them a permanent usefulness. They are written by a gentleman of talents, who is *practically* well acquainted with the subject.* (See communication on common sheep and coarse and combing wools, p. 362, of the present volume.)

Information concerning Wool, suitable for the cheapest supply of very strong and useful woollens and worsteds.

In the late experiments to procure *home-made* articles of military clothing for the United States, the success was greater than could have been expected, in the present unperfected and untried state of American manufactures. In regard to all goods made of cotton, for purposes requiring strength or neat, uniform appearance, the present capacity of this country was manifested, on this occasion, *to be far greater than our actual or probable wants require.* In this valuable class of cotton goods, are included strong neat shirting and sheeting, cotton (and half cotton) hose, cotton drilling for vests, pantaloons, guetres, bedsacks, working frocks and trowsers, rifle frocks and overalls, knapsacks and haversacks, sewing cotton, and various small but necessary articles.

In the woollen branch, offers were *abundant* and the finer the goods or the materials proposed, the more

* Mr. T. Coxe, late purveyor of public supplies.

ready the disposition, the more abundant the quantity in proportion to the demand, and moderate the prices. —The best cloths, suitable for the commissioned officers, were offered upon terms the least advanced above the European prices, owing to the spreading of the Merino sheep. The cloths for the non-commissioned officers and privates, were offered upon terms advanced in the next degree of moderation above the European prices, because the great body of our native or old stock of sheep produce wool, which, after picking out a little coarse and a good deal of fine, will do well for cloths suitable for these two purposes. But it is *a substantial fact* well worthy of observation and consideration, that the inferior qualities of strong heavy goods, though most easy to make, (requiring no nicety of color, dressing, or finishing) were the *most advanced* above the European goods of the same kinds in the terms on which they were offered. The reason of this clearly appears to be, that a sufficient number of our sheep are not *of the breeds which yield great quantities of the coarse wool.* The descriptions of goods made out of this sort of wool in England are as follows:—

Kendall *woollen* cloths (usually called kendall cottons) in pieces of twenty yards, 27 and 28 inches wide for nineteen to twenty-four shillings sterling, undyed, used these ten or twelve years for vest backs,—white stoved twilled kerseys for overalls, of the same widths, in 30 yard pieces at 45 shillings and 6 pence to 48 shillings and 6 pence sterling per piece. Undyed bocking baizes, 5 to 6 quarters wide, at 2s. to 2s. 2d. sterling per yard. White *stoved* swanskins for vests, un-

twilled or plain, raised, about 7-8 of a yard wide, at 2s. sterling per yard, and blankets for the private men, at 2s. to 2s. 4d. sterling per pound.

It is plain, that there is not the least difficulty to procure *an abundance of wool for these and all other purposes of the army, navy and hospitals.* But it is certain, that they require *a quality* of wool inferior to what our sheep produce. It has therefore appeared to be a duty to bring these facts before the public, in order that our farmers may consider the propriety of breeding sheep, which are *great bearers* of long, coarse wool, the longer part of which is necessary for combing, and the shorter part of which will make kendalls, kerseys, bocking baize, drapery baize, welch plains, &c. The best of this coarse wool is the kind fit for common point blankets. It is well understood, that in making this last mentioned important article, if the coarse wool be too long, the manufacturers in England *chop it with an axe*, that it may be the better raised by the card, after the blanket has been wove.

It is well known, that there are sufficient numbers of these heavy fleeced sheep in the country, for breeders. They ought to be taken great care of and used to get up a sufficient stock of common wool. In England, they breed *both* kinds (besides Merino's) *and keep the breeds and flocks carefully separated.* It is to be observed, that these *heavy fleeces* would be in weight, more than double the common ones, yet they will sell within ten per cent. or perhaps five per cent. in price, of the good common wool.

The manufacture of the coarser hosiery and coat-

ings and cheapest wool hats and carpets, also require these cheap and heavy fleeces.

It is well known, that no nation has ever assisted their manufactures and business in general, so effectually as the English, by breeding animals suitable to the various objects and purposes. As we are to hold competition with them we must do the same.

It is believed, on repeated examination and consideration, that these ideas about *heavy fleeces* of coarse wool are founded in absolute truth, and highly important to our manufactures of *strong, useful and coarse woollens*, and especially of all *worsted* stuffs and *worsted* hosiery, as this wool can, nearly all, be prepared by *the comb*—not *by the card.* Callimancoes, shalloons, rattinets, durants, tammies, camblets, moreens, bombazetts, bombazines, *worsted* hosiery, caps and mittens, and other useful goods can only be made of wool long enough to be *combed.* The Merino and other fine wool cannot be combed. It must be carded and is fit only for woollen, not *worsted* goods.

Notes, on Wool and Kersey.

The last paper treated of the twilled three point woollen blanket. It may be useful to add, that it is certain, that if a parcel of wool were collected in the United States, no better than the worst *fourth part* of the average quality of our native fleeces (unimproved by the Merino) that wool would be found better than the quality of the wool of the excellent three point blankets imported from England. Such worst quarter part of our wool would not be too long for blankets.

Very little of it is so long as to render it difficult to card.—That little may be chopt to make it card. The longest, which will card, is best for point blankets. It is repeated, that the chain or warp of blankets ought not to be too hardly twisted; and that *the weft or filling cannot be too soft and loose, if it has only strength or adherence enough to bear the operation of weaving.*

Kersey is usually made for the army, the navy, the working people, and the frugal. It is equally durable, compared with *low priced* broad cloths, as milled cassimere is, compared with the *fine* broad cloths.—Cassimere, called at first *kerseymer* was a mere handsome *improvement on the kersey* in England, about 40 or 45 years ago.

The weight of good *white* kersey, 27 inches wide is from eleven ounces and one-half to twelve ounces and one-half, or thirteen ounces per running yard. It is always tweeled, and certainly owes a great part of its strength to *the tweel.* It is made out of the coarsest woolled breeds of sheep in England, *after the long wool fit for combing and stuffs*, is taken out of the heavy fleeces. Hence the cost of good strong kerseys in England, white and undyed, is as low as forty-five shillings sterling for a piece, which is called thirty, and will measure twenty-nine yards: that is eighteen pence and three-fifths sterling, or about thirty-four cents and one-half. This article, white kersey, makes excellent military vests and overalls and is peculiarly acceptable to armies. When dyed drab, blue, brown, &c. it is equally good for working people, seamen, fishermen, &c. It ought never to be forgotten, that the specie price of the *Lincolnshire*, English, wool is about

one-sixth of a dollar there, and that after taking out *for the comb*, the wool that will not card, the rest is kept for kerseys and blankets. Hence England leads the world in the *coarse woollen* manufacture and commerce. This point has escaped the emperor of France in his energetic Merino plan. He is in real danger of rendering *his woollen branch too fine and costly*. The comparative utility of the two kinds of wool is evinced by the fact, that the British do not manufacture of Spanish and Hereford and South Down (the finer classes of) wool, one-fourth part of their whole quantity. Very much of the cloths of these are used in the United Kingdom, and in their various colonies. Their foreign trade rests but little on these *finest* wools and cloths. Their great shipments to foreign countries are in "*worsted stuffs*" of combed wool, and in woollen cloths, plains, coatings, kerseys, bockings, draperies, kendalls, flannels, lion skins, carpets, blankets and other goods of *carded* wool, from the heavy fleeced and long woolled sheep of the Lincolnshire, Teeswater, Leicestershire, South (Devon:) Cotteswold (Glocestershire) and Kentish flocks, and from various other flocks or breeds that do not bear fine wool.

The great object at present in the United States, is *the utmost economy of our wool.* It is therefore suggested and submitted, that every thing for service, should be tweeled or twilled, for strength and duration. The kersey is a peculiarly important example. Cotton and leathern substitutes for woollens are well worthy of attention, and ought to be used. The size of yarn for the chain and filling of kersey, (and so of blankets) can be *exactly* settled by examining a piece of narrow, or

three-quarter English kersey. This sort is always single folded, never double folded. The English double fold kerseys are dressed like coatings for surtouts. They are valuable, but are not here meant. It is the proper *narrow* kersey, which requires very little dressing. They are stretched on tenter hooks to dry, or for stoving with brimstone, in which manner the nicest and best for military dress are often finished in the white. For that purpose the wool should be made quite clean by picking and washing.

It is remarked of kerseys, that the filling or weft should be considerably larger than the chain or warp. One side is always better covered than the other. That should be made the right side, and the goods require only to be stretched and pressed.

It may be useful to remark here, that it is computed in England, that rather more than one third of their whole wool is adapted to *the comb*, and therefore not fit to card without chopping. But this operation is very easy.

The prospect of the United States, as to sheep may be inferred from the fact, that the lowest average estimate for the whole kingdom of England with Wales, is twenty-six sheep to every quantity of thirty-three acres and one third of land, rich and barren, vale, plain and mountain.

It is a duty, and it is sound policy always to bear a decided testimony in favour of those respectable citizens of the United States, who have taken successful pains to introduce into our country the very valuable merino breed of sheep, from Spain and Portugal. No manufacture has progressed here with such rapidity as

that of fine broad cloths. The merino breeders have justly a high credit for their *intelligence* and exertions, in extending their attention to that nice and curious manufacture.

There appears in the United States a redundancy of young men, *collegiately educated in the arts and sciences*, and of the classes, which usually apply to divinity, medicine, law, and commerce. It is a truth, that a knowledge of the arts and sciences, is extremely valuable as a *preparative* and *an accompaniment* to an intelligent apprenticeship to manufactures. Mechanism, chemistry, metallurgy, hydraulics, geometry, mensuration, pneumatics, the mechanic powers, natural history, &c. &c. are very useful, and almost necessary in the great manufacturing establishments, which enrich Europe. The powerful Lavoisier was placed at the head of that manufacture of France, which now *governs* Europe—*the art of making gunpowder*. The good and scientific Priestley poured a gratuitous flood of light upon the metallick manufactures, which have enriched Birmingham. The mechanical talents of Arkwright, Bolton, Watt and others, informed by nature or in the schools, have rendered the world tributary to Britain. It is observed with great satisfaction that many of our younger citizens of the most respectable connexions, have recently applied themselves to the manufacturing branches, and it is suggested, on much consideration, that it may be well for themselves and for our country, if a number of our best educated, best connected, and best endowed young men should turn their earliest attention, *in the character of apprentices to the owners of respectable establishments*, to the manufacturing department of our trade and commerce.

On the practicability of a Canal between the head of Seneca lake, with Tioga creek. By Philip Church, Esquire.

[The following letters are those referred to by Mr. Church, in Memoirs, p. 270.]

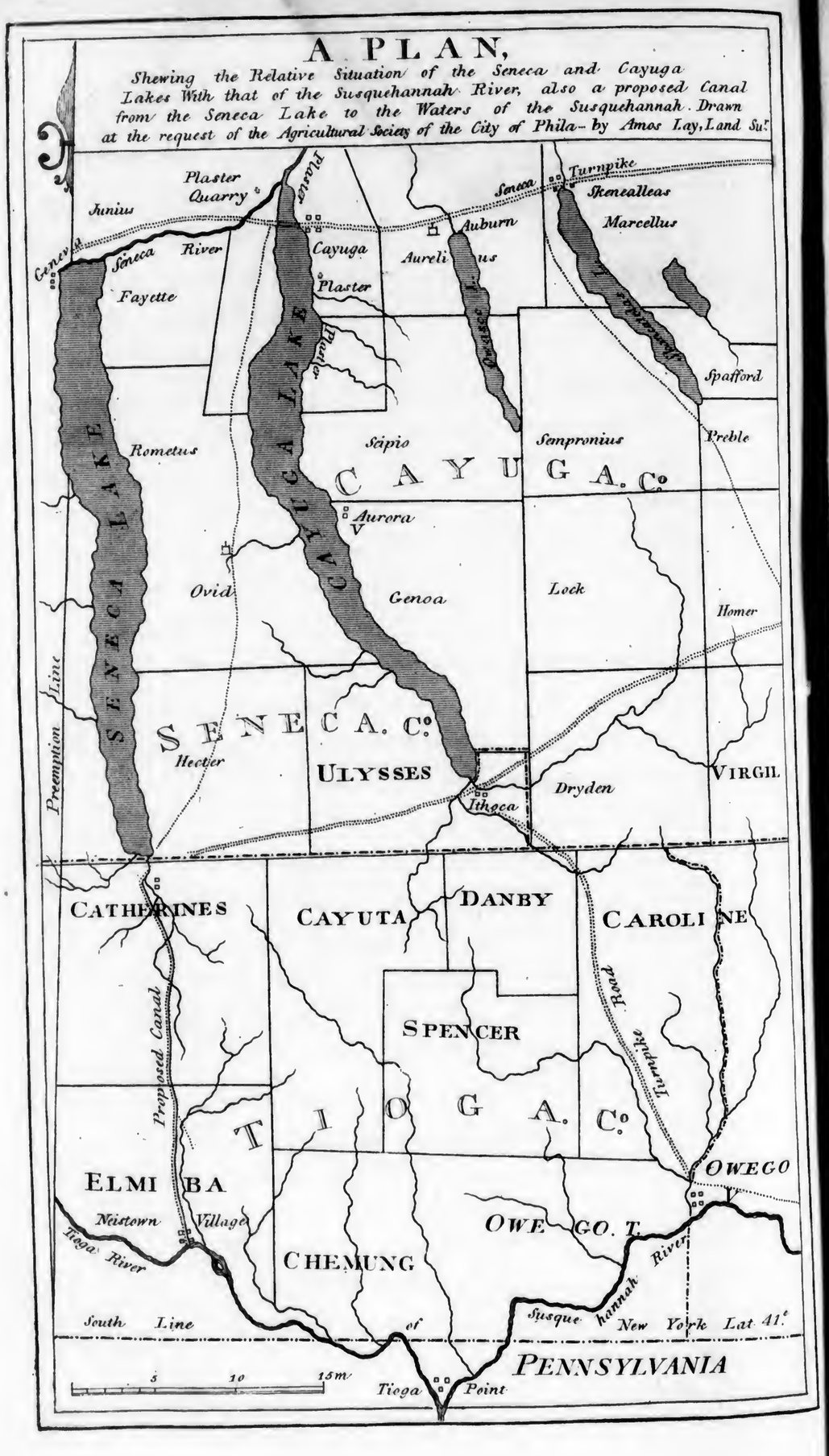
"I have not, until a few days since, been able to procure such precise and accurate information, as would authorize me to make any communications to you, respecting the practicability of connecting, by a canal, the head of Seneca lake with the Tioga branch of the Susquehanna: and I have thought it better not to write to you, on the other subjects of your letter, until it was ascertained whether there was a probability that the canal in question could be made; because had the making of it been deemed impracticable, it might in some respects have altered the steps, which your legislature will (perhaps I should rather say, ought to) take, to connect Philadelphia with the western part of this state.

"Between the Seneca lake and the Susquehanna there is a large and very wet swamp, from this issues *Seneca inlet*, which after running thirteen miles in a northerly direction, falls into Seneca lake: no part of this stream is navigable excepting the last three miles adjoining the lake; this part will admit boats of considerable burden; the stream is a perennial one, rather swift, but its course is not obstructed by rapids or falls:—*Newtown creek* rises in the same swamp, and, after running in a southerly direction nine miles, falls into the Tioga branch of the Susquehanna, near the

village of Newtown: no part of this stream is navigable, it is not so swift a stream as the Seneca inlet, and is equally free from falls or rapids. I have no doubt but that the waters of these creeks, together with what could be obtained from the swamp, out of which they flow, would be more than sufficient to feed a canal.

"This information will convince you that no obstacle exists to prevent the opening the proposed canal; indeed nature has permitted it to be more easily accomplished than the most sanguine person could have expected. What the cost of making it would be, a personal survey by a scientific person can alone determine; it may, however, be safely asserted, that the expense, when compared with the magnitude of the object, will not only be moderate but trifling.

"If the members of your legislature intend to benefit Pennsylvania, by obtaining, to any considerable extent, the trade of the Gennessee country, or by retaining the small portion of it which you now possess, I should suppose, that the undertaking, which would first naturally present itself, would be the complete improvement of the navigation of the Susquehanna, from that part of it, which can be most advantageously connected, by roads or canals, with the Delaware and its waters, as far up the river as the point where the Tioga branch crosses your state line. This, although of primary importance, is not the only necessary undertaking: it is essential, for reasons which will be hereafter mentioned, that a good turnpike road should be made from the western bank of the Susquehanna (opposite to the place, which may be deemed most eligible to connect with the Delaware) to that part of the



Pennsylvania line, from which the road could be most easily continued to the village of Newtown. Should such exertions be made on your part, to procure our trade, they will be met by reciprocal efforts on ours. Your turnpike road and improvement of the Susquehanna, would doubtless be immediately extended from your line to the village of Newtown—operations, which, from the shortness of the distance, might, to be sure, be easily effected, but which are so entirely dependent upon yours that they never will be even commenced until yours shall be in great forwardness.

"Previous to the consideration of the advantages, that the proposed improvements would produce, both for your state and for the western part of New York, it will not, perhaps, be useless to take a general view of the most usual mode pursued by the storekeepers in this country, in making their remittances to the merchants from whom they purchase goods.

"By much the greater part, indeed I believe all the goods, that are sold in this country, are brought either from Philadelphia or from New York. The produce of this country, *if wheat*, is sent in arks (which cannot return against the stream) to Baltimore or Philadelphia, or which is the same thing to some intermediate place; if *live stock*, it is driven to Philadelphia or New York. The advantage of sending wheat to Baltimore is, that, the conveyance of it being solely by water, the expense and waste of storage, loading and unloading, &c. are prevented. This saving is, nevertheless, more than counterbalanced, by the dangerous navigation of the lower part of the Susquehanna; by the additional distance, which the hands, who navigate the

arks, have to return home by land; by the loss of time and expense which the storekeeper experiences in going to Philadelphia or New York, to purchase goods; and by, what is of more consequence to him than all the rest, the unwillingness of merchants to credit country store-keepers, who, instead of making a direct remittance of their produce in payment for the goods purchased, turns that produce into cash in a distant city, by which the certainty of making the regular remittance is lessened in proportion to the accidents and temptations, to which the store-keeper will be liable, by either losing, squandering, or defrauding the merchant of so transferable a property as money. You will readily perceive that the store-keeper, who takes his produce to Philadelphia and purchases his goods in New York, is almost equally subjected to the last mentioned disadvantage: then, why, you ask, does he not purchase his goods in Pennsylvania?—because the navigation of the Susquehanna is so uncertain that he cannot tell when to calculate upon receiving them; and because, even if he could wait, without inconvenience, for five or six months, for heavy articles, there is no road to enable him to carry home goods bearing land carriage, and without which he could not carry on his business.

"It is true, that, notwithstanding these disadvantages, some few store-keepers take their produce to, and buy their goods in Philadelphia; but it is mostly those who make their remittances in live stock; and even many of these, within a few years have preferred driving their cattle to the North river.—This they have done with reluctance, because vegetation lasts a month

longer in Pennsylvania than in this country, the effect of which is that the cattle may be kept in this country until the very moment that the grass fails, and yet could get good pasture on their way to the southward, and of course would arrive in so much better order; that the grazier in the neighbourhood of Philadelphia, being able to keep them on pasture some time after their arrival, could afford to give more for them than the grazier on the North river. Great as these advantages of your southern situation are, they are still insufficient to compensate for the state of your roads, which are so very bad, that the cattle cannot be prevented from leaving them and running into the woods, where they feed upon the laurel and of course many of them are thereby killed. This last circumstance entirely prevents the sending sheep into Pennsylvania."

NUMBER II.

November 25th, 1810.

"My last letter finished with taking a general view of the trade between this country and the cities of Baltimore, Philadelphia and New York. I shall now proceed to consider what portion of the trade of the western part of this state, Pennsylvania would immediately enjoy from the making the proposed turnpike road, and from the contemplated improvements in the navigation of the Susquehanna; and also, how far those benefits might be extended, and the ultimate benefits your state would derive from the extension.

"The turnpike road being finished, the country

through which it passed, would soon be settled; the laurel and other noxious plants would be destroyed, and the pasture would be in much greater quantity, better and cheaper, than on the present roads;—this would not only enable us to send sheep into Pennsylvania and increase the number of cattle driven to that state, but would also bring back to their former market those storekeepers, who have, within these three years past, resorted to the North river. Many farmers, who have not sufficient employment for their horses during the winter, would take their produce to the establishments, which would naturally be made on the Susquehanna, sell it, and bring back, at a moderate price, either goods for the store-keepers or necessaries for their own families. In the event of an extraordinary failure of the waters of the Susquehanna, the storekeeper could bring up into the country the goods of light carriage absolutely necessary to carry on his trade, and wait until the waters should rise to transport his heavy goods. It is, however, to be hoped, that the navigation of the Susquehanna would be so far improved as to render such an alternative unnecessary. Men of business could not only travel speedily from this country to Pennsylvania, say to your capital, but the establishment of a regular and frequent communication by mail would take place, a circumstance of more importance, both in carrying on and promoting trade and intercourse between distant places, than is, perhaps, generally imagined.

"The navigation of the Susquehanna being improved, so as to admit loaded boats to return up to Newtown, those, who at present consider Baltimore as

their market, owing to the facility with which they can return with their goods, would find it more to their advantage to carry their produce to Philadelphia; and for the same reason, all those who took their produce, whether in wheat or live stock, to Philadelphia, would exchange them for goods in that city, and thereby save the expense and other inconveniencies, which I have before stated they were subjected to, in proceeding to New York for the purpose of purchasing the articles of their trade.

"The circuit of rich and fertile country, the produce of which Pennsylvania would command, and the inhabitants of which she would supply with foreign and domestic merchandize and manufactures, would be enlarged to an extent far beyond what your merchants, manufacturers or legislators are, I conjecture aware of. But let me more particularly consider how far those improvements might be extended.

"The first operation, which presents itself, is the connecting Seneca lake with the Tioga; from the information contained in my last letter you will be enabled to judge of the practicability of accomplishing this. The next is the improvement of the navigation of the Tioga above Newtown, and of the Conhocton and Canisteo rivers, as far up as Bath on the former, and Arkport on the latter. Whether it is possible to render those streams navigable at all seasons of the year, I cannot positively say, but I conclude that it is from the circumstance of some families, who now reside in this country, having moved up from Fishing creek, near Northumberland, in the months of June of the years 1796-7, in boats carrying ten tons, to within

one mile of Hornill's (within a few miles of Arkport) on the Canisteo. After that month, or until the freshets prevail, those streams are so shallow as not to admit of navigation, although they always contain a considerable quantity of water. The next improvement is the making a turnpike road from Philadelphia to Amsterdam on lake Erie, making Angelica one of the points of direction. From the Pennsylvania line to Angelica and Amsterdam, the country would admit of a good road, the practicability, expense, &c. of making the road from Philadelphia to the Pennsylvauia line, you can best determine. I should suppose, that those improvements would secure to Pennsylvania a trade with nearly all the country between Seneca lake and lake Erie, and certainly the trade in live stock of the whole of the Genessee country. How far I may be correct in these opinions, the enclosed map, together with the information I shall give you respecting the trade with Montreal, will in some degree enable you to decide. Had there been a direct road from Philadelphia to Angelica, it would have saved several thousand dollars, in the expense of making a new settlement. By a reference to the map you will find that Angelica is nearer to Philadelphia, in a direct line, than to New York, or to the North river, by the proposed turnpike in this state, which will be nearly finished next fall. How many gentlemen of your city have been incredulous, when they have been informed that Amsterdam was nearer, in a direct line, to Philadelphia than to New York, merely because it happens to lie in the same state, of which the latter city is the metropolis.

"I consider Montreal, and not New York, as your great rival in the trade of our western country, which has within these two years commenced, and must rapidly continue, to be diverted from the latter to the former city. The merchants of Montreal have, within a few months, established stores at the mouth of of the Genessee river, at Sodus bay, and at Otsego, and are giving notice in all our papers that they will not only purchase produce, but advance money on produce deposited with them for transportation to Montreal. They are even extending their views still further, and are making diligent enquiries as to the practicability of rendering the Genessee river navigable, whereby they hope to be enabled to send merchandize up that river, and thence crossing to the Allegheny (a distance of but twenty-five miles) be able to supply the western part of Pennsylvania, the state of Ohio &c. with goods at a cheaper rate than they can be furnished from any of the ports of the United States. From the number of very high and perpendicular falls in the Genessee, many may deem such an undertaking not only as utterly impracticable, but visionary; yet who shall say what it is impossible, for enterprize, aided by capital, and stimulated by a sufficient motive, to effect? who, that is acquainted with the history of the internal improvement of Great Britain, the hills that have been surmounted, the mountains that have been bored through, the rivers over which canals have been thrown, shall assert that Niagara itself will not yield to their exertions? who, that contemplates the assiduity and perseverance, with which her merchants and manufacturers, aided by

government, are turning into canals the ditches of those countries, from which there is the remotest prospect of any quantity of produce being diverted to their island, thus making up for their own want of territory, by engrossing to themselves the interior of other nations—can suppose that they will not strain every nerve to possess themselves of the productions of so rich and extensive a country, rapidly increasing in population and wealth, and with the importance of which its own Atlantic inhabitants are either unacquainted, or else undervalue and disregard.

"Montreal, however, cannot divert from you the produce of this country in live stock, nor can she, as her harbor is frozen for a very great portion of the year, enter into a competition with you to obtain the produce in wheat, to that extent which her local situation and the enterprize of her merchants would otherwise enable her to do. The high price of wheat generally depends upon foreign demand, and in proportion as the demand for so absolutely necessary an article of support is urgent, in that proportion the price is exorbitant; which, together with the bounty, on the importation of that grain, frequently given by the countries in which scarcity exists, produces such an influx of wheat as speedily to supply the exigency, and to render the demand of short duration. The probability, therefore, is, that a foreign market would be glutted from the ports of the United States, before Montreal could supply it with a ship-load of grain, and of course the Montreal merchant could not afford to give so much for wheat as our merchants of the middle states. Indeed it is a fact, that except during the

embargo, wheat never has been so high at Montreal as in the ports of the United States.

"It is evident that the return trade from a sea-port to the interior, which consists of articles of high value in comparison with their bulk and weight, is carried on with cheapness, in some degree proportionate to the quantity of the trade, from the interior to the sea-ports, which consists of heavy and bulky produce but of small value. The immense quantity of this rude produce, which, by making the improvements suggested, Pennsylvania would certainly draw into the midst of her population from the Genessee country, &c. would enable her to transmit by return, up the Susquehanna and Canisteo, her merchandize, manufactures and surplus articles, at a very cheap rate, by means of the numerous persons and conveyances employed in bringing the rude produce to her markets. Nor is the importance of the measure limited here, Pennsylvanians might transport their goods from the Canisteo to the Allegheny (a distance of only 48 miles, 20 of which, from Hornill's to Angelica, is nearly turnpiked) and thence down that river to the western part of Pennsylvania, to Pittsburgh and the Ohio, and thus undersell the Montreal merchant, however enterprising and industrious.

"I assure you, that I suggested, several years ago, to many gentlemen of Philadelphia, the practicability of supplying the whole western country with goods at a much cheaper rate, by means of the Susquehanna and Allegheny rivers, than they have been furnished at by the present mode of land carriage to Pittsburgh—and, yet, there were very few, who did not regard the

project as visionary ! this last summer, two store-keepers, one of whom had purchased his goods in Philadelphia, the other in New York, passed through Angelica, and thence proceeded with their property down the Allegheny—a circumstance, which increases my confidence, that, when the proper improvements shall have been made, the Ohio or western states will all be supplied with goods by this route.

"I shall be happy to communicate such further information as may be calculated to induce your legislature to make those improvements, and to convince them of the absolute necessity of commencing them speedily, if they wish to prevent the trade of this important country from passing entirely to Canada. But let me remark that, besides addressing the legislature, Franklin ought to appeal to the merchants, manufacturers and holders of real estate, in Philadelphia, and urge them to exert themselves to obtain a cheap and expeditious route of communication with the headwaters of the Susquehanna and Allegheny, and of course with the northern and western lakes. I believe that, if they had any just conception of the importance of such a measure that they would make every effort, in conjunction with the legislature to complete the improvements I have mentioned."

NOTES.

The *Genessee country* consists of seven counties ; three *northern*, viz. Ontario, Genessee, and Niagara ; four *southern*, viz. Steuben, Allegheny, Cattaraugus and Chatauque.—Ontario county is, it is believed, the third in the state as to population, although there is still much unsettled land in it.

Prom Geneva, the principal town of Ontario county, to Albany, the distance is 192 miles, in a direct line : from the same town to Philadelphia, about 210.

From Amsterdam, the principal town of Niagara county, to Albany 299 miles—to Philadelphia 305 miles.

From Batavia, the principal town of Genessee county, to Albany 259 miles—to Philadelphia 242.

From Bath, principal town of Steuben county, by the turnpike now completing, to Kingston on the North river, 205 miles—to Philadelphia, by Newtown, Wilkesbarre and Easton, 210.

From Angelica, principal town of Allegheny county, to Kingston 245 miles—to Philadelphia 218.

From Great Valley creek, centre of Cattaraugus county, by way of Angelica, to Kingston 273 miles—to Philadelphia 248.

From Mayville, principal town of Chatauque county, bordering on lake Erie, by way of Angelica, to Kingston 297 miles—to Philadelphia 272.

SHEPHERD'S DOG.—*From the Sportsman's Cabinet*, 2 *vols. 4to. London.*

This dog is the most timid, obedient, placid, serene, and grateful in the creation: he seems studiously conscious of the purposes for which he was formed, and is never so perceptibly gratified, as when affording the most incesssant proofs of his unsullied integrity.—Instinctively prone to industry he is alive to the slightest sensation of his employer, and would rather double and treble the watch line of circumspection, than be seen indulging in a state of neglectful indolence.—The breed is propagated and preserved with the greatest respect to purity in the northern parts of the kingdom of England, as well as in the highlands of Scotland, where, in the extensive tracts and uncultivated wilds, their services exceed description.—

Constitutionally calm, patient, and philosophic, the sheep dog seems totally lost to every appearance of novelty, and insensible to every attraction beyond the protection and indefatigable preservation of the flock committed to his charge.—In the most sequestered and remote spots, dreary wilds and lofty mountains, almost inaccessible to man, this dog becomes an incredible and trusty substitute; for once initiated in the ground-work of his office, he soon acquires a perfect knowledge of the extent of his walk, as well as every individual of his flock. And will as regularly select his own, and disperse obtruders as the most faithful and attentive shepherd in existence.—This becomes the more extraordinary to the contemplative mind,

when it is recollected what immense flocks are seen to cover the downy hills of Hants and Wilts, as far as the eye can reach without control; and to know that by a single signal from the shepherd, this faithful, sagacious animal, replete with energy, vigilance, and activity, will make his circle, so as to surround a flock of hundreds, and bring them within any compass that may be required.

The sheep dog is so completely absorbed in what seems the sole business and employment of his life, that he does not bestow a look, or indulge a wish beyond the constant protection of the trust reposed in him, and to execute the commands of his master; which he is always incessantly anxious to receive, and in fact is invariably looking for by every solicitous attention it is possible to conceive.—Inured to all weathers, fatigue and hunger, he is the least voracious of the species, subsists upon little, and may be justly considered truly emblematic of content.—Though there is the appearance of a somniferous indolence in the exterior, it is by no means a constitutional mark of habitual inability; on the contrary, the sagacity, fidelity, and comprehensive penetration of this kind of dog is equal to any other, but that there is a thoughtful or expressive gravity annexed to this particular race, as if they were absolutely conscious of their own utility in business of importance, and the value of the stock so confidently committed to their care.

Amidst the infinity of cases so constantly issuing from the press, in which proofs almost incredible are authentically adduced of the courage, sagacity, fidelity, gratitude, and self denial of different kinds of dogs,

many are to be found upon record appertaining to this particular race; if they are not so numerous as some other sorts, it may be fairly attributed to the little proportional chance they have (from their remote and sequestered employment) of displaying those powers in an equal degree with dogs more engaged in the bustle of human society.

Dr. Anderson (in his translation from Dr. Pallas) introduces the following instance of sagacity in a shepherd's dog, which he considers truly astonishing; and it will create no surprise with those who are in the least acquainted with their perfections.

"The owner himself having been hanged some years ago for sheep stealing, the following fact, among others respecting the dog, was authenticated by evidence upon his trial. When the man intended to steal any sheep, he did not do it himself, but detached his dog to perform the business. With this view, under pretence of looking at the sheep with an intention to purchase them, he went through the flock with the dog at his feet, to whom he secretly gave a signal, so as to let him know the individuals he wanted, to the number of ten or twenty, out of a flock of some hundreds; he then went away, and at a distance of several miles sent back the dog by himself in the night time, who picked out the individual sheep that had been pointed out to him, separated them from the flock, and drove them before him by himself, till overtaking his master to whom he relinquished them."

The shepherd's dog rather shuns than seems anxious to obtain the caresses of strangers, of whom he always appears to be shy and suspicious; it being remarkable, that when refreshing upon a journey with the flock, he seldom reposes but close to the feet or body of his master; who well knows if he but deposits his coat or his wallet, and gives the animal the accustomed signal; when the sheep are at pasture, he may absent himself for hours, and at his return find the whole as safe and regular as if it had been under his own inspection. Although it is already observed, these dogs afford no evident external proof of quick conception, or rapid execution (except in all matters relative to the flock, to which their every faculty appertains,) yet their sagacity and fidelity is found equal to every other branch of the species, when necessarily brought into useful action.

"In the month of February 1795, as Mr. Boulstead's son, of Great Salkeld, in Cumberland, was attending the sheep of his father upon Great Salkeld common, he had the misfortune to fall and break his leg.—He was then at the distance of three miles from home, no chance of any persons coming in so unfrequented a place within call, and evening very fast approaching: in this dreadful dilemma, suffering extreme pain from the fracture, and laying upon the damp ground at so dreary a season of the year, his agitated spirits suggested to him the following expedient: Folding one of his gloves in his pocket handkerchief, he fastened it round the neck of the dog, and rather emphatically ordered him "home." These dogs, trained so admirably to orders and signals during their attendance upon the flock, are well known to be under the most minute subjection, and to execute the commands of their masters with an alacrity scarcely to be conceived.

Perfectly convinced of some inexplicable disquietude from the situation in which his master lay, he set off at a pace, which soon brought him to the house, where he scratched with great violence at the door for immediate admittance.—This obtained, the parents were in the utmost alarm and consternation at his appearance, but more particularly when they had examined the handkerchief and its contents.—Instantly concluding beyond a doubt, that some accident had befallen their son, they did not delay a moment going in search of him; and the dog, apparently conscious the principal part of his duty was yet to be performed, anxiously led the way and conducted the agitated parents to the spot where their son lay overwhelmed with pain, increased by the awful uncertainty of his situation.—Happily this was effected just at the close of day, when being immediately removed, and the necessary assistance procured, he soon recovered, and was never more pleasingly engaged than when reciting the sagacity and gratitude of his faithful follower, who then became his constant companion."

The instances of intelligence in the shepherd's dog are recorded in all books treating of the manners and habits of the dog tribe. One more may be mentioned from a recent publication. It is given for the purpose of stimulating the American farmer to possess himself of one of the breed as soon as possible.—Speaking of the "Currach of Kildare," the author says, "The commonage is stocked by a prescriptive pro-

portion, attached to the adjacent farms: every sheep owner has a particular raddled mark; the shepherd's dogs are so trained, that if a sheep, with a strange mark, comes on his master's front, the dog will single him out and worry him off."—See statistical survey of the county of Kildare, by T. J. Rawson, Dublin, 1807, p. 121. J. M.

The Pyracantha, or evergreen-thorn, recommended to the attention of the farmer, as superior in many respects to any other plant yet tried in this country for the purpose of forming close and substantial live fences. With remarks on the proper mode of its application, culture, trimming, &c. Respectfully inscribed to the President and members of the Agricultural Society of Philadelphia. By Thomas Main.

The Pyracantha is an indeciduous shrub, thickly set with small oval leaves, and abundantly armed with sharp prickles, After it is three years old, it annually produces its umbels of white flowers, which are rather pretty than splendid, in the month of June, at the same time when the American hedge thorn is in blossom. By the beginning of September it appears embellished with numerous long roquets, and large clusters of scarlet coloured berries, which continue on the plant through a great part of the winter. At the commencement of frosty weather, the green hue of its foliage is changed into a deep purple, of which complexion the whole plant remains until the return of spring, when its leaves again resume their verdant tincture, but of a tarnished and dingy appearance, till the new shoots restore its former freshness and beauty. The mode of growth, and appearance of the Pyracantha, is not easy to be described; its lowermost limbs and sprays recline upon the surface of the earth, and in a few years closely cover a considerable space, around the original stem, which in a generous soil will sometimes soon acquire the size of a person's ancle; but it

carries this thickness to no great height, being branched from the bottom, and irregularly diffused into numbers of rambling limbs, mixed and naturally interwoven with many other more flexible sprays and upright shoots, rising in an entangled mass to the height of ten or twelve feet; but of the altitude which this plant may ultimately attain, in a congenial soil, I am not informed.

The Pyracantha, like most other plants that nature has in part consigned to human care, requires to be cultivated in its infancy. Stirring the soil and clearing the surface around occasionally from weeds, tends greatly to accelerate its progress to strength and maturity. Whenever any of its procumbent limbs or sprigs happen to be covered with mould in the genial season, they immediately take root; so that one original plant may in a few years be surrounded with a numerous progeny, attached to each other by intermediate ties, and connected with the common parent, by conjunctive bonds of union, at different heights from the surface. The roots of the Pyracantha, however, do not run far and send up suckers at a distance like the common locust; so that its propensity to take root, by layers, is no way detrimental to its being closely confined within a desirable and correct boundary.

No plant appears to agree better with pruning than the Pyracantha. Trimming its smaller sprays with the hedge-shears, and loping off its larger limbs with the bill, in proper seasons, and at due intervals, is productive of a numerous train of new vigorous shoots, and contributes to multiply their entangled ramifications.

The early and extraordinary fecundity of the Pyracantha, is a circumstance of much importance to the hedger. To shew this in the following point of view may perhaps savour of the extravagant, it is nevertheless strictly true. Since the commencement of my nursery here, I have furnished plants of the hedge-thorn, sufficient, at the distance which they ought to be set, only, to plant upwards of 100 miles of hedging. Had each of these been a Pyracantha, they would have been enough to have run 1000 miles of a close hedge; which in a very few years, say ten, would have been capable of furnishing seed and plants sufficient to have enclosed every arable field in the United States.

Every one who has attempted to raise thorn-hedges in this country, must know how difficult it is to obtain seed even for small experiments, of the several species of haw thorns, indigenous to America, and if I had not by accident discovered, in the year 1795, that kind which is a distinct species of the Cratægus Cordata, or of the *two* haw thorns with heart shaped leaves, one of which I have named the American hedge-thorn, I am certain I never should have been able to procure a sufficiency of seed from all the other sorts in this neighbourhood, to have answered my intention. But however plentiful the berries of the hedge-thorn generally are, in comparison to those of the other species of haw thorns, its fecundity is far inferior to the Pyracantha, which cannot only be propagated by seed, but every plant in a hedge of it may, in the third or fourth year of its age, be made, by laying, to produce ten, twenty, or more plants, with good roots, and consequently afford materials for planting a new hedge, ten

or twenty times the length of the original; and this by the mere play-work of children. This, when taken into the estimate along with its exuberant production of seed, renders the increase of its prolific powers so rapid, as almost to exceed belief, to stagger credulity, and outstrip the celerity of our wishes. These are not the visionary prospections of an infatuated theorist, pursuing the shadows of imagination, but the deductions of practical veracity.

Disastrous events sometimes lead to far off and future benefits. It is now thirty five years, when, being at sea, and forced to land at the back of the British Isle of Wight, in travelling across the country, I, for the first time, saw the Pyracantha; it was a single plant, trained upon the gable end of a brick building, and neatly spread upon the wall; it exhibited at that season, being the month of October, a drapery of dark green foliage, profusely interspersed with large clusters of scarlet coloured fruit. I never saw a Pyracantha again until the year 1796, when being employed in collecting different kinds of plants to bring over here, I happened to see two or three of the Pyracantha in training to cover a tool house, in a garden in Scotland. These had no fruit upon them, but the beauty of the one I had formerly seen in the Isle of Wight, instantly recurring to my remembrance, I resolved to bring some sets along with me; these, from the length of the voyage, all perished by the way; but sending for a new assortment the next year, I received two plants of the Pyracantha in tolerable preservation, though it was late in June when they arrived, and the whole package much abused, and contentiously detained by

the custom house in Alexandria. By careful nursing, my two little plants both succeeded. I planted them in different parts of my nursery, intending to propagate from them merely for ornament; for at that time I had no idea of the Pyracantha being a suitable plant for live fences; nor ever had heard, or read, that it had been applied to that purpose. Each of these two plants, in about four years, by the extension of their lower branches, covered a space of nine or ten feet in diameter, spread naturally close upon the surface. But in the second year I layed forty or fifty of their sprigs in the ground, after these were rooted next year, I planted them in a row in the nursery, and culled from thence occasionally, several of them for sale: leaving the remainder at last about a yard apart. The two original plants began to bear the third year, and finding it more convenient to raise handsome plants from seed, I never troubled myself afterwards to raise them from layers. Being at length in the habit of raising considerable numbers of Pyracantha plants, for the purpose of ornamental hedges to purchasers, and encouraged by the promising appearance of the short row, raised from layers, and the encreasing strength of my two original plants, I began to entertain a notion of trying it on a larger scale, as a live fence, and in the year 1806, commenced the execution of my projected essay. Every part of the farm which I now occupy, on every line where I could have any hope that the hedge-thorn would succeed, being already hedged with that plant. I had no where to try the Pyracantha but a length of about two hundred yards of thin, meagre clay soil, in a bleak situation, exposed

to the clear scope of the north west wind. Forced by a sort of necessity, to try it there, I accordingly did so, setting the plants about a yard apart. Having great distrust that the soil was too poor to nourish them to sufficient strength, even with the aid of a little manure, which I scattered along the central furrow, I planted a small honey locust in each interval between, and in the same line with the Pyracantha. Twice, and sometimes but once a year, I stirred the hedge course with the plough, and cleaned the intervals about the roots of the plants, from weeds, by a small garden hoe. Perceiving in a few years, from its thriving appearance, that this hedge would soon produce a considerable quantity of seed, I trimmed it sparingly for that purpose, and not so much as I knew to be requisite, to induce the plants quickly to close with each other; and to give the whole a more handsome appearance. Being in a remote corner, not in sight of the house, it suffered in its infancy many species of injury. It has however thriven in such a manner, that the greater part of the honey locusts have been smothered by the luxuriant growth of the Pyracantha. I never had much notion of a mixture of plants in live fences, and this experiment has in some measure, though not completely, confirmed my opinion.

I have now trimmed and ditched a small portion of this line of hedge, in order to show what powers the Pyracantha possesses to form a live fence, on such a poor soil, with the assistance of a ditch outside, and a bank taken from thence and raised close to the hedge on the inside of it. On a better soil, I am confident that the Pyracantha will less require the assistance of

ditching, than the hedge-thorn, as the short row which I raised from layers now sufficiently evinces. Being anxious to save every sprig of it for the sake of seed, I never trimmed it until last year, when I cut it down to about four feet from the surface. It is now upwards of nine feet in height, and presents a close, strong and commanding aspect of defence, affording a handsome specimen of accidental hedging, naturally interwoven, without splashing, training or trimming, except the once cutting down as mentioned.

On a view of the ditched portion of my Pyracantha hedge, the consequence is easy to be perceived; the flexible undergrowth of the plants will lean down and serve to defend the face of the ditch from the effects of frosts. In a free soil, they will reach the bottom, where the extremities of the sprays will sometimes, in situations nearly level, be covered by the sediment which they will serve to arrest in the time of rain, and taking root from thence, send up in process of time a new offspring of shoots, strong or weak, according as the nature of the soil may be more or less favourable for their nourishment: and where stagnant water is not too long retained in the ditch to injure them. This it is evident will take place in favourable situations. But although this will not always be the result, it is beyond doubt, that in forming the bank close by the back of the hedge, numbers of the extremities of the limbs and sprigs will be covered up in the earth, and will there certainly take root and surmount the top of the bank with new embattled ranks of eminent resistance; so that the whole exterior face of the work will in time be covered with a double or treble range of

impenetrable armour, connected in one thorny mass of defiance.

But although I have now such a high opinion of the Pyracantha, for live fences, I am not out of conceit of the American *hedge-thorn*, as it is truly far superior to all the other species of hawthorns, that ever I have seen, for the purpose of hedging. Other names have also been invented lately for this plant, with what honesty of intention, I shall leave it to the consciences of such geniuses to determine: it has been called by such the Virginia thorn, the Washington thorn, and perhaps by other names that I have not heard of; but which I, as being the first who discovered its superior properties as a hedge plant, and introduced it to public notice, have long since distinguished by the name of the American *hedge-thorn*. This plant is easily known from all the other kinds of hawthorns, by its commonly bearing large clusters of very small light crimson coloured berries, each of which contains five stones, and by its flowering in the month of June, when all the other sorts have set their fruit. But neither hedges of this, nor of any other of the various native hawthorns, including the European hawthorn, (or *Cratægus oxycantha*) also, can so easily or effectually be made close at the bottom, as the Pyracantha.

It is not such hedges as are generally seen in Britain, that will prove a sufficient security to us, against the intrusion of hogs and other small domestic animals. Our larger cattle, also, being of necessity suffered to range in woods, and unenclosed lands, at discretion, have every opportunity to find out, and break through the weaker parts of our fences. It is there-

fore necessary that our hedges should possess the double properties of closeness and strength to guard against both those species of trespassers. The Pyracantha, by itself, on a good soil, is the best plant that I know of, to effect both of those purposes. On a poorer soil it will often require the aid of ditching, but the ditch ought never to be made, until the hedge is four or five years old, by which delay, the hedge can be much more easily and effectually cultivated, than if it had been planted on the bank of a ditch at first, as in the British method: this however cannot be done without the assistance of temporary fences. But on a flat, rich and deep soil, such as the prairies of the west, where timber cannot be obtained, a five or six foot ditch, and bank proportional, may answer for the Pyracantha pretty well, without any other protective or temporary fence; planting a double hedge row in this case, one in the usual place outside, next the ditch, and another near the foot of the bank, inside, which will, with very little training, cover the whole bank, in a few years, with a complete coat of resistance. On land that is but tolerably good, one row of the hedge thorn, and another of the Pyracantha, at the distance of four or five feet from the former, and on the outside of it, will make an excellent fence in a few years, where the hedge-thorn alone would be a long time easily pervaded, both by large and small animals: even with the aid of the troublesome and tedious operation of splashing. I am sorry that it is out of my power, by any description that I am capable of writing, to give the reader a clear and correct idea of a hedge of this double description,

and more sorry that I have had no opportunity, though long desired, to show a model of it in practice.

Different soils, situations and circumstances, will require a somewhat different mode in the application of the Pyracantha. In the early stages of the business of hedging, which is yet but beginning in this country, no ingenious experimentalist ought to tye himself to the opinions and practices of others that have gone before him; but set his own skill and contrivance to work, in order, if possible, to discover a still better method. The writings and recommendations of others are oftentimes not to be implicitly received. Infatuated, as it were, with the children of our own begetting, we see in our own inventions, beauties and perfections which no other eye can perceive. It is therefore prudent to adopt with caution, whatever is thus brought forward for imitation. An essay on a small scale, conducted with attention, patience and perseverance, where there are any doubts respecting the result, is always the safest; and when successful, will do more towards introducing the practice to a neighbourhood, than all that books or writings can perform. To the enterprising, industrious and discerning agriculturalists, in the various parts of the country where live fences are becoming every day more and more indispensable, it is unnecessary to say more in recommending them to try the Pyracantha, although something more yet remains to be stated.

In the year 1810, being about to publish a treatise on hedging, which fell through for the want of support, a gentleman, friendly to the work, advised me to read Dr. Anderson's Essays on rural subjects, before

I should issue my own piece to the public. His book was written many years ago, and adapted to the climate and other local contingencies of Britain. In reading it I was highly gratified to find that a writer of his practical skill and discernment, had long since recommended the Pyracantha, as a fit plant to fill up gaps, and close the bottoms of hedges in that country; though I had never heard of, nor seen it applied to that purpose, nor ever knew it, but in the transient glance of its name, in catalogues of plants, except as already related, until I became intimately acquainted with it in this country. Previous to reading Dr. Anderson's essays, I had for a number of years perceived, that the most intemperate heat of the weather here, had no other effect upon the Pyracantha, than to cherish its growth, and that when once it had taken root, it never languished during the severest drought, but continued in those times more rapidly to elongate its shoots; and retained, without shrinking, the usual brightness of its verdure. I considered that the strongest heat of our summer sun was congenial to its nature; and knowing now that it has been recommended by the judicious agriculturist above named, as a suitable plant for the purpose which he describes, under the weak and winking influence of the sun in Scotland, I am confident that it grows faster, and will attain to far superior strength in America. Of what country it is a native, I know not;* but I know that it bears the

* Dr. Martyn says that it is a native of the south of Europe; common on Caucasus, and in the Chersonesus Taurica; also in China. It was cultivated in England in 1629. It is now called *mespilus pyracantha* by botanists: and *buisson ardent* in French, from the redness of its berries.

Dr. Martyn further remarks, that the genera Cratægus, Sorbus and Mespilus are very nearly allied, and scarcely to be distinguished by the number of styles. The leaves in Sorbus are pinnate, in Cratægus, angular, and in Mespilus, commonly entire.

Martyn's Edition of Miller's Gardener's Dictionary.

J. M.

utmost intensity of our frosts, equally well as the indigenous plants in this neighbourhood. I have said nothing of the beauty of Pyracantha hedges, that being only a secondary consideration: nevertheless, few of the vegetable tribes can exhibit, in the fall of the year, a richer and more splendid display of beauty, than the vast profusion of its clustered berries show among the empurpled foliage of the plant, particularly as it appears before the eye that pursues the long continued perspective riband of it in a hedge-row.

I have a considerable quantity of Pyracantha berries, which will be sold in small parcels to applicants, any time before March. Letters (post paid) will receive all proper attention.

George Town, District of Columbia. Dec. 1812.

On Potatoes.

The following paper on *potatoes*, by *Arthur Young*, Esquire, is published to shew the curious facts it contains, and as information to us of the value of the root. That it is an *exhauster* we have long known. The idea that potatoes are valuable as preparatory to a *wheat crop* is not now so prevalent as formerly. The desire of those farmers who wish to save labour, and *double work* their *dung*, by planting potatoes on fallows intended for *wheat*, is injurious and fallacious. The ground for potatoes must be more highly manured, than a crop of wheat requires. If the quantity of dung proper for a wheat crop only, is laid on for potatoes and wheat, little fertility will be left after the crops are gathered; nor will either crop be abundant. The late gathering *potatoes* retards sowing *wheat* in due season; and although in some seasons, wheat after potatoes succeeds, it is generally a hazardous and ineligible practice. In *England* the planting potatoes, and particularly on wheat fallows is forbidden in leases; and restrictions on their culture are common. Their frequent failures of grain crops force the cultivation of the *potatoe;* which, no doubt, is a highly valuable product, but should be cultivated as a crop *by itself;* and not in connexion with a grain course. I find this opinion, though not generally adopted, is not singular, and is the result of my own experience. When I mean to sow *winter* grain after *potatoes*, I always allow a greater proportion of manure, and believe *rye* a much surer crop than *wheat*.

Mr. Young, in another paper on the subject, gives a long detail of experiments on feeding *potatoes*, to various species of stock. His enumeration of pecuniary value per bushel, will shew the advantages of this food, compared with other esculents, for our domestic animals and enable our farmers to draw their own conclusions.

	Sterling.
Feeding *horses* with *potatoes*, brings their value, for this purpose, to	*L.* 0 1 6 or 33⅓ cents.
Feeding *cattle*,	0 1 0 or 22⅔
Feeding *hogs*,	0 1 0 ——

Reckoning our dollar at 4*s.* 6*d.* sterling.

R. PETERS.

[Mr. Bordley has clearly shown the greater economy of potatoes, over corn, in fatting hogs. See "Notes on Husbandry," 1st edition, p. 230.] J. M.

Copy of a letter from Arthur Young, Esq. on the subject of Potatoes, published in the Farmer's Journal, 30th March, 1812.

To the editor of the FARMER'S JOURNAL.*

Sir,

Having been urged by several gentlemen, who heard a lecture lately read to the Board of Agriculture, on extending the culture of potatoes, to print that paper

* Printed by Evans and Ruffy, at the office of the Farmer's Journal, 29, Budge Row, London.

as soon as possible, I declined it, for a reason which appeared to me sufficient; because not one pamphlet in an hundred circulates among farmers: but as your useful paper is very generally read, I beg leave to communicate to you those circumstances which may immediately tend to induce a more general cultivation of that important root.

The average import of wheat for the last twelve years has been little short of 700,000 quarters per annum, at an expense, in that period, of above 30,000,000 pounds sterling. Supposing the grass and arable land of the kingdom to amount only to 25,000,000 of acres; half an acre in every hundred added to the present space under this crop, would produce human food sufficient to answer the purpose of all such imported wheat; and this at the moderate estimate of one acre of potatoes being equal to two of wheat: hence then the difficulty of feeding ourselves without a dependence on foreigners and enemies cannot be reckoned insuperable; in truth, it would be so very easy a business, that we can only express astonishment that some means have not already been adopted to secure so necessary a supply. But if the root was attended to, merely with a view of human food, the culture would be liable to great variations, according to the sale price; so that if wheat happened to be cheap, and potatoes consequently low in price, they might be neglected, and a scarcity of wheat happen without the root for a substitute; such a vibration, of many potatoes in one year and few in the next, is greatly to be deprecated when the subsistence of the people is in question. On this acco[illegible] urged the necessity of the

root being cultivated for the use of horses, cattle, and hogs, in order that the farmers might be able to spare a portion of their crops in times of scarcity, to sell to the people; and I presume to suppose, that if four or five per cent. of the land of every farm were thus employed, the advantage to the farmer would be very considerable; as he would in such a case be paid for that support of the people, which in the present order of things, has cost, as stated above, more than 30,000,000 pounds sterling paid for foreign wheat.

The inducement to landlords and farmers thus to extend this branch of cultivation, would necessarily depend on their being convinced that the root is profitably applicable to the live stock I have mentioned: to prove this point I quoted a great variety of experiments, published by the men who made them, shewing, that potatoes paid 1s. 6d. per bushel of 66 lbs. as food for horses, in saving oats or hay, or both; and 1s. per bushel on the average of horses, cattle, and hogs: these trials were made by practical men, many of them of great experience, and of known accuracy. In whatever manner the produce of potatoes is, on an average, reasonably calculated, it will evidently appear, that no farmer could entertain any well-founded apprehension of the culture proving disadvantageous. It is admitted that in many cases the root is an exhauster, and consequently by no means beneficial to the farm, relative to that portion of the crop which is sold; but for all the rest of the produce applied to feeding and fattening live stock, the dunghill amply remunerates for the deficiency.

When the present state of the corn markets is con-

sidered, I trust that you will agree with me, that an extended cultivation of potatoes is, at the present moment, an object much deserving attention; and when it is further considered that the parochial poor, through much the greater part of the kingdom, are enabled, by rates, to consume wheat at present as in ordinary times, the importance of the proposal now submitted to your consideration, may receive additional weight.

Such a subject as this calls for the attention of parliament, but not on the spur of a difficulty: it should be taken into consideration when none presses. I fear that such an interference will become doubly necessary, from a circumstance not immediately apparent; leases of a right duration are quickly going out of fashion, so that we may expect a gradual declension in the produce of corn, which will by and by be felt severely, if it be not so at present. The mischievous idea of a depreciated currency, has given a severe blow to long leases; and I cannot but think it an astonishing solecism, to find that orators and writers can at one time speak and write in favour of agriculture and leases, and at other times declaim on the visions of depreciation; a notion which, if it continues to be blazoned as it has been, will not leave a long lease in the kingdom, and consequently not permit a valuable improvement by any tenant, from Cornwall to Caithness.

I have the honour to be, &c.

ARTHUR YOUNG.

Sackville Street, London,
March 25, 1812.

On internal Improvements, by Roads, Canals, &c.

[The two following letters are taken from Mr. William J. Duane's pamphlet, referred to, page 273, of this volume, and should be read in connection with Mr. Church's letters, page 23, &c. of this appendix.]

LETTER XII.

I have shown that the most important internal improvement would be, a water communication between the eastern and western rivers; that on this object the legislature ought to bestow immediate attention; and that it is not necessary for the state to expend a cent of public money upon that part of the route between the Delaware and the Susquehanna, which is more than one fourth of the whole distance, and the most difficult to open; I say the most difficult to open, because it is now ascertained that a canal must be opened the whole way, and that even that part of the Schuylkill between Norristown and Reading, which it was at first supposed, might be used, will not answer.

As, therefore, no money is necessary for the eastern part, there ought to be the less difficulty in going on with the remainder, that is, the improvement of the west branch of the Susquehanna. But before any thing of this kind can be attempted, accurate surveys, estimates, &c. will be necessary, and these should be obtained from able engineers, aided by watermen of experience, and from no other persons.

The next object, most worthy of legislative attention, and which can be effected without any impedi-

ment to the other, is the substantial improvement of the Susquehanna, from Middletown to the north line of the state. This work should also be superintended by an engineer, that the navigation may be really improved, and not made more difficult, as has hitherto been often the case in other instances. In order that this improvement, which is of great importance, may be so considered by every reader, I will offer my remarks under these distinct heads: 1. The present state of the river: 2. The improvement wanted, and the expense of making it: 3. The effects of improvement from the north east branch: 4. Those from the north west branch.

1. The Susquehanna has at all seasons a sufficient quantity of water for any sort of river navigation, if it were confined within one channel, or rather if its breadth were not so great; but, the bed of the river being very wide, owing to the force and volume of the spring floods, it frequently happens in summer that large boats cannot obtain an ascending navigation. As it is here proposed merely to improve the river from Middletown to the state line, there is no necessity for saying any thing of that part of it below Middletown; from that town to Wilkesbarre, about 125 miles, the river is in several places impeded by rocks and ripples, which might be easily removed, under the direction of an engineer, so as to diminish the width of the main channel, and afford a complete ascending, as well as descending navigation, at all times. From Wilkesbarre to the state line, 103 miles, there are no falls, and but two or three rocks injurious to navigation; the obstructions, to be removed, are what are termed tumbling stones, or pieces of rocks detached from a fixed foundation, and ripples, which may be termed rapids in contradistinction from the pools, or deep gently flowing water above and below them. As it is to the ripples that most attention is due, there being above 20 in the distance of 95 miles, it is necessary to mention their nature more particularly:—they appear like so many bars running across the river; they are principally formed of clay and gravel; and, as the volume of water is always very great, in passing these bars it flows with a rapidity in proportion to the obstruction. So easily may these ripples be removed, that it has not been uncommon for boatmen to dig a channel through them, in order that they might ascend. Perhaps the best way to remedy these defects would be to raise wing walls wherever there is a ripple, that is, to diminish the width, and of course increase the depth of the channel; if this were done, the navigation would be so complete, that boats of ten or twelve tons might ascend the river in its lowest state in summer.

2. Should the legislature think proper to improve this river, the improvement should be made from the state line, with the stream; because by the lower improvement, the general navigation would not be so soon brought into action, as by the upper; because the great utility of the work will be to draw into our state, the produce of the south west part of New York; and, because the work itself can in this manner be best accomplished.

I have now before me a statement of the nature and extent of the obstructions to be removed, in the first 100 miles, as well as an estimate of the expense of re-

moval: these data are founded upon the authority of Judge Mathias Hollenbach, who is well known to possess great personal knowledge of the Susquehanna, and upon that of Messrs. Alpheus Dodge, John P. Arndt and David Rosecrantz, for many years, and at this time boatmen upon this river, upon whose knowledge and veracity strict reliance may be placed. According to this statement, the extent of all the obstructions for 103 miles, is but eight miles; these obstructions I have before described; the average distance between the obstructions is about two and an half miles; the expense of removing the whole is stated to be 3205 dollars, but as we know that all estimates of clearing rivers and opening roads, have hitherto been exceeded by the actual expenditure, I add to this sum 50 per cent. which makes the total cost 4807 dollars and 50 cents.

The nature of the obstructions from Wilkesbarre to Middletown, I am not so well acquainted with; it is certain, however, that their removal will require greater labour and expense than those above Wilkesbarre, say twice as much, or 10,000 dollars; and that the whole cost of clearing 230 miles of one of the most important rivers in the union, will amount to 15,000 dollars; this surely is so insignificant a sum compared with the object, that there should be no hesitation in appropriating it. But, as I have before said, much will depend upon the superintendence; the money ought not to be appropriated, if ignorant or interested men are to expend it; but, if put at the disposal of an honest and capable engineer, aided by intelligent watermen, will certainly answer all expectations.

3. To be able to appreciate justly and fully the importance of the Susquehanna, and the immense advantages which Pennsylvania would derive from opening the navigation effectually from the north line of the state, little more is necessary than to examine a good map, and to trace the sources of this great river.

The north east branch of it rises in the lakes Otsego and Canederago; it is navigable for small boats from its source, and might be easily made so for boats of any description: its source, therefore, is nearly in the geographical centre of the state of New York; it is within ten miles of the Mohawk river and of the canals making by New York along the bank of that river as a water communication to the lake Ontario. After passing lake Otsego, this branch flows nearly in a southern direction for 70 miles, through some of the most productive lands and flourishing settlements in the state of New York; in its course, it is joined by the Unadilla river, and having reached our line passes it, forms what is called the Great Bend, and then reenters New York: it then proceeds along the southern line of New York for about 60 miles, receives the river Chenango, again enters Pennsylvania, and is joined by the north west or Tioga branch from the westward.

This north eastern branch is so intimately connected, by its own and its tributary waters, with the productive counties of Otsego and Chenango in particular, and affords advantages so superior to those of the Mohawk, at least in its present state, that it cannot but become the medium of an intercourse highly beneficial to Pennsylvania, if our legislature will faithfully do

their duty. For, however desirous New York may be to serve its own capital, as Pennsylvania ought to be to serve Philadelphia, it will not be so unjust and impolitic as to tax its remote citizens to do so, but will aid in improving its southern districts and waters, although serviceable to Pennsylvania, as we now improve ours, although obviously and chiefly to the benefit of Baltimore. We may, therefore, reasonably calculate upon the improvement of those rivers, within New York, which water some millions of her best lands, although, as those rivers flow into Pennsylvania, the produce of the lands may be conveyed into this state, and not be transported to New York. At all events, it is our duty to do our part in this great work; the people of New York who reside upon the waters flowing into Pennsylvania, call for improvements, and if we were to derive no other advantages than the north east branch offers to us, they would be sufficient to justify the expense of thoroughly improving the Susquehanna within our own lines. Important as this branch is, however, it is much less so in every point of view than the north west branch, of which I am now to treat.

4. The north western branch, as every reader may see upon the map of the United States, opens a trade with from six to eight millions of acres of as fine land as any in the world; that is, by good management on the part of Pennsylvania, the whole import and export trade, into and from the middle and western districts of New York, from lake Oneida to lake Erie, and comprehending the flourishing Genessee country, may be secured or made to pass through Pennsylvania. That

this may be clearly understood, I will mention the particular points, by which this connexion may be opened.

The north western branch of the Susquehanna is formed by rivers and creeks, some of which have the same source as the Genessee and Allegheny rivers, whilst others are connected with, or rise with the numerous small lakes, which flow into the Ontario. The *southern, or Tioga source*, is within about twelve miles of the head and navigable waters of the Allegheny; a fact, which shows, that if there were no route entirely through our own state, connecting the eastern and western waters, a good one might thus be opened. By this source a direct and easy communication is opened to the head waters of the Genessee river, and down that river there is a direct communication with lake Ontario. The *middle source* is the river Canistro, which is navigable to the town of Arkport, situated at the head of the Canistro, about 75 miles by water from the Pennsylvania line: from Arkport to the Genessee river the distance is but twelve miles; to lake Canadarque ten miles; to Angelica twenty two miles; and to the Allegheny at Oleanne, Major Hoop's settlement, forty five miles. At the latter place the Allegheny is sixteen rods wide, and the navigation excellent all the way to Pittsburgh. The *northern source* is the river Conhocton, upon which is situated the town of Bath, from whence it is but about ten miles to Crooked lake, which opens a water communication to lake Ontario.

These three sources unite a little to the west of the town called Painted Post, and form the north west branch of the Susquehanna, which flows for almost 80 miles, nearly in a south eastern direction, until it en-

ters Pennsylvania, and joins the north eastern branch at Tioga Point.

Upon this north western branch, and at a distance of eighteen miles north west of Tioga Point, is situated a handsome and flourishing village, called Newtown, from whence it is but twenty one miles to Seneca lake, and from the head of Seneca lake, the distance by water to lake Ontario is under one hundred miles.

Of all the points that I have mentioned, this is, in my opinion, the most important; 1. Because I have the best information, that can perhaps be furnished, from persons well acquainted with the country, for saying that a complete water communication, by canals and a few small locks, can be opened from Newtown to the head of Seneca lake, for less than 10,000 dollars: 2. Because I know that Mr. Philip Church, son of Mr. J. B. Church, who owns a large and valuable estate (100,000 acres) upon both banks of the river Genessee, including the town of Angelica, attended during two sessions of our legislature at Lancaster, and pledged himself that a canal or a turnpike road should be made between Newtown and Seneca lake, if Pennsylvania would improve the Susquehanna within her own lines, say for 200 miles, which I have already shown could be done for 15,000 dollars at the utmost; 3. Because the formation of this canal or road, and this improvement of the Susquehanna, would certainly, as Mr. Church declared, be the means of conveying the produce of six millions of acres into Pennsylvania, but a small portion of which we now receive, owing to the neglect of the legislature to improve the Susquehanna.

When it is considered, therefore, that nature has formed four important and safe outlets, for the trade of the western part of New York, all of which unite at our state line; that whatever difficulties exist in New York, its citizens offer to remove; and that the present state of the Susquehanna alone opposes the entrance into our state of all the produce conveyed by those outlets; it surely is not only surprising but shameful, that Pennsylvania should have representatives so ignorant or regardless of her interests, as not to have hearkened to the admonition of Mr. Church, and proceeded at once to improve our own waters.

No doubt, Mr. Church and the other residents in the western part of New York, would prefer aiding the trade of the city of New York, and not that of Philadelphia, if they could do so as cheaply and conveniently; but, as that gentleman said, "the Susquehanna is the natural course through which we should go, that route is shorter and cheaper than by the turnpike road to Catskill or Newburgh; clear your river, and you will command the whole of our trade."

But Pennsylvania has as yet done nothing, and therefore Mr. Church and others have abandoned the works, which they had begun, for opening a communication between the Susquehanna and the lakes, and are now actively engaged in improving the roads from the western counties to the Hudson. For one road alone Mr. Church subscribed to the amount of 13,750 dollars, a fact, which shows the enterprize and ability of this gentleman, and the supineness of our legislature in not adopting the useful suggestions which he offered to them. In consequence of this narrow policy, the trade

of the western counties now passes either to Montreal by the St. Lawrence, or to New York, by the Bath, Coshecton and Newburgh turnpike, and thence down the Hudson. It is not at all surprising, therefore, that the reports of the treasury should exhibit the decline of Philadelphia, and the rise of New York, in very striking colours.—Before the state of New York began to form roads and canals, Pennsylvania, as an importing state, stood in comparison with New York as twelve to seven; but since New York began to make roads and canals, since even party rancour has been suppressed for this great object, the scale has turned as much against Pennsylvania and for New York, as it was before the reverse.

What indeed can be a more convincing proof of the intelligence of the New York legislature, and the ignorance of our own, than these facts: a canal navigation is now completing along the Mohawk: a turnpike road is now forming from Bath to Angelica: at the last session of the legislature of New York, Dewitt Clinton, Gouverneur Morris, Stephen Van Rensellaer, P. B. Porter, Simeon Dewitt, Thomas Eddy and William North, all men of talents, of high reputation, and of opposite politics, were appointed a committee to explore the country between the Hudson and lake Erie, and to report to the next legislature such improvements as they might think necessary for the internal prosperity of the state, and for securing to the city of New York its present high standing; these commissioners left Albany in June last, and have just returned after performing their duty. What a contrast does this form to our stagnant condition; not one public

road, not one canal forming; not one cent appropriated at the last session for any public improvement whatever; not one commissioner appointed to inquire what should be done to raise the state to its former splendor, or preserve it upon a level with our sister states—all this economy too, whilst millions are left in the hands of delinquent and able creditors, at one or two per cent. interest.

In my next I will continue to point out the importance and necessity of abandoning this negative kind of legislation and government, and to show how easily we may derive from the south western part of New York, ten times as much trade and intercourse as Maryland derives from our own south western districts. No one can pretend to dispute the superiority of Baltimore as a market, for the counties of Adams, York, Franklin, Cumberland, &c. however he may regret the loss of their intercourse with Philadelphia; and it must be equally apparent, that Philadelphia offers a superior market to that of New York for twelve or fourteen counties of that state; we have given the people of Adams, &c. turnpike roads and canals to carry their produce to Maryland, and the least we can do is to improve our northern waters, our Susquehanna, if for no other purpose than to supply us with an equal quantity of produce to that which Maryland naturally receives.

September 8th, 1810.

LETTER XIII.

In my last letter, I endeavoured to show the importance of improving the Susquehanna, from its entrance at the north line of our state to Middletown; and, in order to induce you to agree with me in opinion respecting that object, I traced the sources of the river and the several outlets, by which we may draw into Pennsylvania, the immense and valuable products of the western parts of New York.

Although my chief intent is to urge the improvement of the Susquehanna, and although I intended to defer to another number any recommendation for improving the Delaware, I find this place the most fit for speaking of that object, since it is connected with the question of relative distance to New York or Philadelphia from the lakes, which I intend to discuss in this letter.

The river Delaware is principally formed by two large streams, the Mohock, which rises in the county of Delaware, and the Popacton, which rises within the county of Ulster, both in the state of New York, and the latter within fifteen miles of the Hudson. The navigation of both these streams is adequate to the ascent or descent of vessels of ten tons, for above fifty miles, before they unite and form the Delaware. After having joined, the Delaware flows nearly in a south eastern direction, for about eighty five miles, where it turns to the south at the town of Milford, and passes nearly in a south western direction, for about seventy miles, to Easton, from Easton to tide water at Trenton, fifty miles, nearly a south eastern direction; from head

of tide water to Philadelphia, in a south western direction, thirty four miles—total 239.

I am aware that, to render the navigation of this river perfectly safe, a large expenditure would be necessary; but it is not the cost but the advantages that follow the expenditure, which a wise legislature should consider. The society for promoting internal improvements, which existed in 1791-2, estimated the cost of clearing the river at less than 8000 dollars, but if it could be cleared for thrice that sum, the state should rejoice at the appropriation. In its present state, the river is navigable during the spring floods from its source: from Milford, heavy articles are transported on rafts to Philadelphia, at a less expense than they could be boated to Philadelphia from Easton; upon a single board or spar raft, from 300 to 400 bushels of grain have often been transported for above 150 miles: the transportation in this way costs 75 per cent. less than the carriage from Ulster county to New York. It is, however, on account of its advantages as a route of communication from the western parts of New York, that the river deserves attention; and that these advantages, as well as those of the Susquehanna, may be understood and compared with the routes to New York, I will now enumerate the claims of each:

1. I have heretofore shown that there is no water communication from lake Otsego to the Hudson: the distance by land from that lake to Albany is 60 miles, from Albany to New York 165 miles—in all 225. But there is a water communication from lake Otsego down the Susquehanna to Harmony 70 miles, from Harmony to Stockport by land 20 miles turn-

pike; from Stockport to Philadelphia 239—total 329. It is evident therefore, that as the route to New York has 40 miles land carriage, more than the route to Philadelphia, nothing is wanting to secure even some of the trade of the middle counties of New York, but the improvement of the Delaware and Susquehanna. But if this were problematical on account of the difference in distance, this objection is more and more removed every mile to the south and west of lake Otsego.

2. I will not, however, dwell upon the trade of the middle counties, although I am persuaded that the greater part of it may be acquired by Pennsylvania, either by the Susquehanna or the Delaware, should the legislature improve those rivers. The most important object is a communication with the extensive and important country from Seneca lake to lake Erie; and I do again aver, that the whole import and export trade into and from this country may be acquired by this state, through any or all of five distinct routes. Which of those routes should be first made perfect may be ascertained sufficiently well, perhaps, by the subjoined statements; my opinion is, that the improvement of the Susquehanna from the boundary line would answer all the present purposes.

The turnpike road, which is now making from Catskill, on the Hudson, to a point on lake Erie, 20 miles north of Presqu'Isle, passes nearly in a direct line from east to west, and is 296 miles in length. This road passes at the head of Seneca lake, which head is almost exactly half way between the extreme ends of the road at the Hudson and lake Erie. I shall therefore calculate the distances by the several routes to Philadelphia and New York, from Seneca lake.

First Route—To New York.

From Seneca lake to Catskill, by turnpike,	156
From Catskill to New York, by water,	125
	281

Although the total distance by this route is not great, the extent of turnpike is an insurmountable disadvantage, greater than any of the routes to Philadelphia is affected by.

Second Route—To New York.

From Geneva, at the outlet of Seneca lake to Oneida lake,	90
Oneida lake to Mohawk falls,	109
Mohawk falls to Schenectady,	56
Schenectady to Albany,	15
Albany to New York,	165
	435

Of these 17 miles by land: it is to be remarked besides, that although New York has done much to improve the water route for the first 250 miles, the navigation is still more difficult in many places than any part whatever of the Susquehanna, from Middletown to our north line.

First Route—To Philadelphia.

From Seneca lake to Newtown, by land,	21
Newtown to Harmony, by water,	78
Harmony to Stockport, by turnpike,	20
Stockport to Philadelphia, by Delaware,	240
	359

Second Route—To Philadelphia.

From Seneca lake to Newtown, by land,	-	21
Newtown to Tioga Point, by water,		18
Tioga Point to Wilkesbarre, on Susquehanna,		95
Wilkesbarre to Easton, by land,	-	60
Easton to Philadelphia,	- - -	84
		278

I consider this as the best route, under present circumstances, or at least until the canal navigation should be opened from the Delaware to the Susquehanna. Should the legislature expend 5000 dollars upon that part of the route from our state line to Wilkesbarre, there can be no doubt but that the preceding 33 miles would be rendered capable of an easy transportation, by the legislature or citizens of New York. Of that part of the route from Wilkesbarre to Easton, 32 miles were turnpike in 1807, the remaining 28 miles were then an excellent road, and no doubt will also be made turnpike, under the law in force for that purpose. An appropriation for the Delaware part of this route is an object of great consequence.

This route, it is to be observed, is shorter than either of the New York routes; but there are other circumstances which call upon the legislature to improve the north western part of it, from the state line to Wilkesbarre. This town is well situated for becoming a depot for the general produce brought down the Susquehanna; and the Philadelphia bank is about to open a branch there, which will greatly contribute to this object. Should the Susquehanna be improved, therefore, a market is here opened, to which the produce of

the western counties of New York may be brought the whole way by water, and from whence by water and by an average land carriage of but fifteen miles, return cargoes may be taken either to lake Ontario, to the town of Arkport, to Genessee, or within twelve miles of the Allegheny. No route that New York can establish, can prevent this result, if the legislature of Pennsylvania will do their duty.

Third Route—To Philadelphia.

From Seneca lake to Tioga Point,		39
Tioga Point to Nescopeck, on Susquehanna,		121
Nescopeck to Lausanne, by turnpike,		28
Lausanne to Easton, by the Lehigh,		45
Easton to Philadelphia,	- - -	87
		320

Of this route but 49 miles by land. Nescopeck is also favourable for a depot, and the communication with Easton a matter of much consequence. For many articles, particularly grain, Easton is as good a market as Philadelphia: having an excellent stream of water and good mills, the millers of Easton give as good a price for wheat as can be got any where in the neighbourhood of Philadelphia; their flour they send to Philadelphia at twenty five cents per barrel.

Fourth Route—To Philadelphia.

From Seneca lake to Nescopeck,	- -	160
Nescopeck to Sunbury,	- - -	38
Sunbury to Philadelphia,	- -	120
		318

Of this route, 141 by land. Much of the road from Philadelphia to Sunbury is turnpike, and laws exist, authorizing the construction of the remainder in the same manner.

Fifth Route—to Philadelphia.

From Seneca lake to Tioga Point, - -	39
Tioga Point to Middletown, - -	221
Middletown to Philadelphia, - -	84
	344

Of these 344, 105 by land, of which the last 84 are turnpike. If the canals from the Susquehanna to the Delaware were completed, the whole distance from Seneca lake to Philadelphia would be but 330 miles; the whole of which route may be made by water, if the legislature will adopt a system of policy, worthy of the reputation and ability of Pennsylvania.

3. On a fair comparison between these routes to New York and Philadelphia, no intelligent man can hesitate in giving the latter a decided preference, as the market with which a trade can best be maintained by the people residing west of Seneca lake.—Two millions two hundred thousand dollars must be expended, even according to Mr. P. B. Porter and Mr. Gallatin, before the circuitous route of 435 miles, from lake Ontario by the Mohawk, can be opened for an ascending or safe descending navigation to the Hudson, and if this were done, another perhaps equally large expenditure would be necessary to open the navigation from lake Ontario to lake Erie. On the other hand, the route by the turnpike, from the Hudson to lake Erie,

although very direct, is so expensive, that, if the Susquehanna were improved, there is no doubt but that ten tons would pass down that stream, for every one sent by turnpike to the Hudson.

And, as it is so apparent, that, with due exertion, Pennsylvania can secure the trade of that part of New York west of Seneca lake, the superiority as an importing and exporting state to the western waters, must be equally so; yet, as I shall show in a subsequent letter, unless Pennsylvania shall soon exert herself, she will lose not only the trade to the Genessee, &c. but the trade, which she now in a great measure possesses to the western part of Pennsylvania, to Ohio, Kentucky, &c.

All, then, that is wanting, to secure to this state a valuable exchange trade in the products of the respective states, and the profits upon exports, and the goods imported by sea, in return, is, that the legislature should gradually clear the Susquehanna, as I have heretofore pointed out, from its entrance upon our northern boundary line, to Wilkesbarre, Nescopeck, Sunbury, and Middletown. Nature has done much for us, but we have done, comparatively, nothing for ourselves.

September 11*th*, 1810.

Pruning and after Management of Hedges, by Robert Somerville. From Communications to the Board of Agriculture of England, vol. 2d, page 47. London 1805.

Though a strict attention to the foregoing circumstances, during the infancy of a hedge, is highly necessary to produce healthy, vigorous plants, a very considerable part of its beauty and future value will depend upon the pruning and after management that is bestowed upon it.

There is perhaps, no part of the subject upon which a greater contrariety of opinion at present prevails, than the age at which the pruning of hedges ought to commence, the manner of that pruning, or the season of the year, at which it may be given with the greatest possible advantage, and the least risk; the practice with some is to prune from the first year, not only the lateral branches, but the tops also, and give as a reason, that cutting off the extremities of the shoots contributes to the thickening of the hedge, by making them push out a great number of new ones.—The fallacy of this argument, and the mischief with which the practice is attended, we shall elsewhere have occasion to notice.—As to the manner of pruning, or the form of the hedge, these seem, with many, to be matters of indifference, no attention being paid to dressing them in such a way as to have them broad at bottom, and tapering gradually towards the top, many of them being not only of one width from top to bottom, and not a few much heavier and broader above than

they are below; it is obvious that such hedges can neither look well, nor be useful.—The season at which they are trimmed is, in many instances, an improper one, for in place of choosing that time when the plants are least in danger of suffering from an effusion of their juices, which is either at a late period in the autumn, or very early in the spring, the pruning is given in the summer season, when vegetation is in its prime, and the plants are full of juices; the check and injury they must receive from having the whole of their extremities cut off at that period, may well be conceived.

In speaking of the treatment of hedge plants before they are put into the ground, notice has been taken of the necessity of preserving the roots as much as possible; and at the same time shortening the tops: this last operation has two good effects; for by curtailing the top and branches, the roots have less to nourish; and by leaving only two or three inches of the top above ground, in place of growing up with a single stem, it sends out two or three; and as these strike out from the plant so near the earth, each of them has the same effect, and strengthens the hedge as much as the original stem would have done by itself; with this addition, that in place of one prop or support, the hedge will have three or four. After this first pruning, however, no hedge should be touched, or at least very gently, for some years; from an inattention to this circumstance, and the injudicious application of the knife or shears, at an early period, many young hedges are rendered useless, which, under different treatment, would have made excellent fences, with one half the trouble that was required to destroy them. The prac-

tice of cutting over the tops yearly, which is done with a view to render the hedge thicker and more perfect, is one of these mistakes which we would naturally have supposed common sense and observation would have sooner corrected; the effect produced being in almost every instance, the very reverse of what was intended: shortening the main stem of a thorn or any other plant, makes it brush out a number of small stems immediately at the place where it has been cut; and if this operation is repeated once or twice a year, every one of these is again subdivided as it were, by sending out more branches; thus, in a course of years, during which, the hedge makes very small progress upwards, if it be examined, instead of being found to consist of strong vigorous plants, with a good main trunk, each reaching from top to bottom of the hedge, and a sufficient number of lateral branches throughout the whole length of it, it will be found, by such repeated cuttings, in the same stunted situation as certain young trees and shrubs, that are frequently cropped by sheep or cattle. From the repeated crops of young shoots, which the tops send out after every clipping, and the great quantity of nourishment necessary to support such additional numbers, the lateral shoots at the bottom, upon the strength and numbers of which the value of the hedge in a great measure depends, are stinted in their growth, and soon die: the hedge, of course, becomes open and naked at the bottom, and consequently useless as a fence. Where a hedge has been thus ruined, there is no remedy but cutting it over, close by the ground: this will immediately produce a number of healthy, vigorous, upright stems,

which, under proper management, will soon form a good fence.

From the first year of planting, till the hedge has risen to the height of five or six feet, the main stems ought to be left untouched, and the pruning confined solely to the side branches, leaving those next the root pretty long, and gradually tapering towards the top: this pruning of the side branches will make them send out many new shoots from their extremities, which, by repeated trimmings, will become so thick as to fill up every interstice from top to bottom of the hedge; while the main stems, by being left untouched, continue their growth upward, till they arrive at the necessary height; when they may have their extremities cut off with perfect safety. When a hedge has attained the wished for height, all that is requisite afterwards, is regular switchings with a hedge-bill, preserving it pretty broad at bottom, and drawing it gradually to a point at top; this form of a hedge is pleasant to the eye, is well calculated to stand the weather, and by being thus above the nourishment that would have been wasted in supporting a thick, bushy, overgrown top, is retained by the branches at the bottom, which are thereby strengthened, and their numbers considerably increased; while the trunk, by having no more exertion to make in an upward direction, becomes every year stronger and thicker.—A hedge of this sort in full leaf has the appearance of a solid wall; and when viewed after the leaves are shed, presents to the eye a set of massy growing piles, so strong and formidable as to bid defiance to any attempts that may be made to break through them.

On Sheep Folding. From a Publication on Manures, drawn up for the Board of Agriculture, England, by Robert Somerville of Haddington. London, 1795.

The practice of folding sheep as a manure, or rather as a top dressing, is common in many parts of England, and is productive of considerable advantage. They are folded both upon arable and pasture lands; upon the arable lands it is sometimes done before the last furrow, at other times after the grain is sown. This last is found from experience to be the best method of folding, as the urine and dung of the animal remain upon the surface, and soak down gradually; whereas, when the field is folded before the last ploughing, a considerable part of the manure is turned down *and lost*. The spring and summer seems to be the time when this practice is most beneficial; at that time the food of the animal is rich and juicy, but during the winter, unless the sheep are fed upon turnips or hay, their dung is of small value. It is obvious that folding, after the grain is sown, can never be practiced but upon dry soils, and during dry weather.

This way of manuring seems peculiarly adapted to farms, where there is a considerable extent of hill or common pasture, or grass lands, that never come under the plough. In these cases, by bringing the sheep in the evening to the fold, a considerable quantity of manure will be saved, that would otherwise be lost. If the pasture upon which the sheep feed through the day is good, they may be folded, without any detriment to the animal, (if not intended to be fattened,) for a great

part of the year; but where the pasture is scanty, this cannot be done, as they will not be able to pick up a sufficiency of food through the day, to enable them to bear the fatigue of travelling to and from the fold, and fasting all night.

When they are fed in the fold, the case is different; but feeding in the fold will not admit of being practiced as a top dressing after the seed is put in; it seems best calculated as a preparation for wheat or barley, upon fallows; in either of these cases they may be fed in the fold with propriety, as the offal of their food will be ploughed in with the last furrow, and the land properly opened for the reception of the crop; even this requires to be done upon dry light soils; upon these a gentle shower will not be felt, nor will there be any danger of the land being battered with the feet of the sheep; whereas upon clays or deep loams, the soil will sustain more injury by the treading of the sheep in wet weather, than all the benefit communicated by their manure.

Defects of the common way of folding Sheep.

The custom of putting a great number of sheep into a small fold, is very common, allowing them little more than a square yard each, and confining together sheep of every description, young and old, strong and weak; both practices are bad. In the first, if sheep are fed in the fold, the space allotted to each will be so small, that they will be crowded, and a considerable quantity of their food trodden down and destroyed; the breaths of so many, confined together, within such narrow limits, will keep them too warm, and when they are disposed

to lay themselves down, there will not be sufficient room for that purpose.

To avoid these inconveniences, a space containing room enough to afford three or four square yards to every sheep, would answer the purpose much better, and though this large area would not receive so much advantage from one night's folding, yet by allowing the sheep to remain upon it for two or three nights, it would be sufficiently manured, with this additional benefit, that no part of the fodder would be destroyed, by trampling upon, and the animals would have a dry bed, and plenty of room.

The second defect in the present way of folding is equally bad, if not worse; that is the custom of folding sheep of every description together. When a great number, either sheep or other animals, are put together to feed, unless they have an over quantity of food given them, (which every good farmer wishes to avoid) there will always be a struggle, who shall get most of it; in a contest of that kind, it is evident that the strongest will succeed, and by depriving the weaker ones of their food, their weakness will be increased, and a risk incurred of losing them altogether; whereas by picking the flock, and folding the strong and weak sheep separately, both would be benefitted thereby; the strong ones would still have a sufficiency of food, and the weaker sort would be allowed to feed, and lie at their ease: in this situation they would gain strength, and improve in value; in the former, they would be daily growing worse.

In short, wherever folding is practiced, it should be a principal object with the farmer to assort his flock,

and as near as possible, to class those of the same age and strength together, and whatever preference is given, either in the quantity or quality of the food, should fall to the share of the young and weak.

The practice, as far as we are able to judge from the information before us, is entitled to the notice of farmers in every part of the kingdom; but in that, as in every other branch of agriculture, much must be left to the judgment and attention of the farmer, it being impossible to lay down rules that will apply to all the different circumstances of soil, situation, &c. It certainly is best adapted for dry lands, and farms containing much pasture that is never ploughed; upon these, as we have already observed, much manure may be collected that would otherwise be lost; but upon farms that are entirely arable; and where grass makes a part of the rotation, to bring the flock from the pasture, and fold them upon another field, is depriving the grass field of a great part of the benefit that might be expected from its being in pasture, and is enriching one part of the farm at the expense of another. The only instance in which it is warrantable upon an arable farm, is in cases where turnips are raised either upon clay or heavy loam; in either of these cases, they may be eaten with advantage upon grass or stubble fields, as no farmer of common sense would think of eating them where they grow; but as we have already observed, the propriety of this must be left to the judgment of the farmer; much advantage may certainly be derived from it in some situations, and great loss sustained in others.

On Sheep Folding, from Davis's Survey of Wiltshire, drawn up for the Board of Agriculture.

In distant [wheat] lands, the farmers depend solely on the *sheep fold* for manure. They fold as close as possible to the sowing, waiting day by day for the fold to keep pace with them: and in very dry seasons, they fold again, after the wheat is sown.

The great dependence for the barley crop, in the common-field system, is the *sheep fold.*

After the wheat is sown, the fold is sometimes, and very properly, put upon the down land, but more usually upon the wheat stubble, which is to be prepared for barley; but the manure from the fold is not considered of any great value, until the ewes and lambs begin to feed on the water meadows; it then becomes almost *invaluable.* The manure of ewes is reckoned much better than that of wethers, on account of the great quantity of urine which they make. Five hundred ewes, with their lambs, will fold an acre well in one night: and none but those who have seen this kind of husbandry, can form a just idea of the value of the fold of a flock, coming immediately on the fallow land, with their bellies full of quick young grass, from a good watered meadow, and particularly how much it will increase the quantity of the barley crop. The increase may be fairly stated at a quarter (eight bushels) of barley per acre.

The quantity of barley seed sown, is sometimes six bushels, and seldom so little as five. The crop is mown.

On Barilla as a Manure, communicated to the President of "the Philadelphia Society for promoting Agriculture," by Robert Barclay, Esquire, London. Received May 20th, 1814.

Repeated experiments have proved that BARILLA is the most powerful manure that can be applied to land; it produces to the farmer and gardener a considerable saving in time and labour, as it imparts immediately to the soil that sweetening principle, which can otherwise only be acquired by means of the tedious and expensive process of fallowing; in addition to these advantages, it possesses the power of destroying grubs, slugs, and worms, as well as that of correcting every species of acidity in a sour clay or peat soil, the adhesive texture of the former of which will be gradually mellowed by the constant use of Barilla. An old worn-out garden, that has been so repeatedly manured with dung as to produce nothing but luxuriant wood shoots, and rank haulm and leaves, instead of well-flavoured fruit and sweet vegetables, may be restored to fertility by a moderate dressing with Barilla, trenched into the ground at the rate of five hundred weight per acre.

The value of Barilla as a manure, may be easily estimated by those who have used soap ashes, the fertilizing properties of which depend on the quantity of Barilla left in them after the manufacture of the soap; and it appears by analysis, that one ton of soap ashes contains only from seven to ten pounds of Barilla.

With any sort of crop on a farm, this article may be drilled into the ground with the seed, at the rate of one

or two hundred weight per acre: used in this way, or sowed by hand over the land as a top dressing, it possesses the power of preventing the fly from destroying the turnip crop; it may be sown broadcast by hand over the land, and immediately harrowed in with any sort of seed; or it may be made up into compost with ditch or pond scourings, road-scrapings, peat or sand, if intended for clay land; or if intended for light sand, peat, or chalk land, it may be made into compost with clay, and after blending the materials together, by turning, may be used on grass or plowed land, as other manures.

It will make a very strong and most valuable compost manure used thus:—Deposit on the ground a layer of peat, road-scrapings, or any other earth, twelve inches thick, on this place a layer of couch grass, young furze, green brambles, ling, fern, or weeds, twelve inches thick, or a layer of long dung, six inches thick, strew over the couch weeds, fern, &c. or dung, a layer of Barilla, half an inch or an inch thick:—thus proceed with alternate layers, until you have made up the desired quantity of compost; it should then be left a proper time to ferment, after which it may be turned over to blend its particles together, and used as other manures, either on grass or plowed land. In this way, valuable manure may be made on lands which would otherwise be inaccessible to the dung cart without a heavy expense.

Barilla is a most valuable wash for seed wheat or any other seeds. For this purpose, put one pound of it to every gallon of soft water used; place the seed in this mixture, and stir it well for ten minutes, after which

it may be taken out and sowed immediately on the land, or spread thin on a floor and dried for use: the wash may be carried to the compost heap or dung-hill, as manure. It is recommended in all cases where Barilla is used as manure, that it be plowed, harrowed, or dug in as soon as possible after being spread on the land; as, if exposed, the air will rob it of a portion of its salts.

It is probable, from a due consideration of the component parts of Barilla, that the use of it as a manure, at the rate of one hundred weight per acre, on sour wet grass land, will, in addition to rendering the herbage of such land nutritive and abundant, tend to prevent its occasioning the rot to sheep and deer which graze on it.

On Barilla, as a Manure, by the Editor of EVANS *and* RUFFY'S *Farmer's Journal,—a Weekly Paper of respectability, published in London.*

Having lately read, and heard in conversation, very high encomiums on the fertilizing powers of Barilla, when used as a manure, I was anxious to go farther than mere hear-say, and to see experimental proofs of its effects; and being introduced by a friend to the gentleman who I believe was the first to whom the thought of using it occurred, I was by him very courteously and frankly shewn or told all that he had done by way of experiment. I must premise that, independently of his garden, the chief scene of his experiments was a few acres, taken in from a common, of sour, wet,

infertile clay, impregnated with oxide of iron, filled in winter with pools of stagnant water, and rent in summer into deep fissures. He levelled the ground, and deepened and widened the ditch that skirted it, through which the winter stream runs: he then, late in autumn, had it dug ten inches deep, with a spade, such as navigators or canal diggers use, at an expense of two guineas and a half per acre, ridging it up to abide the influences of a winter sky. It was then a reddish and very adhesive clay. On this unpromising soil he has tried potatoes, carrots, parsnips, hemp, flax, pease, beans, cabbage, wheat, and clover, trusting solely to the effects of the Barilla, which he applied in different proportions, at the rate of from one hundred weight to five hundred weight per acre: it was beneficial in every proportion, and most so where the greatest quantity was used. The clover was luxuriant, once cut for soiling, the second time for hay, and a third time for soiling. I have seen some of the straw of the wheat, which is the strongest I ever saw; I have seen the potatoes, carrots, and parsnips, which, in point of size, are not inferior to the best I have ever raised or seen, —and the acreable quantity I learn was great; but the ground and produce have not been accurately ascertained. One thing struck me forcibly;—among other sorts of potatoes, planted in this experimental ground, was one called *ladies' fingers*, which the gentleman had before cultivated in his garden, where their shape and size accorded nearly with their name; but in their new habitation, and with the new manure, they grew to six times the size: and the esculents raised on the experimental ground, to be dressed for family use, far exceeded in luxuriance and flavour those formerly raised in the garden.

He has used it likewise as a top dressing on a sour meadow, where the herbage was coarse, on which when his cows were before pastured, the butter was rank and indifferent, and I am informed it has not since been so. I can vouch that it is now sweet and rich, but his three cows have been fed entirely through the winter on the roots produced on the new ground, and the small patch of clover hay; the meadow hay being still untouched.

The ground is at present in a second course of experimental cropping, with different manures for comparison. I saw some of it digging; it has become more loose and friable, and to use the expression of the labourer, *the stuff has spilt its colour:* it has certainly changed in colour, and apparently in quality. The account I have received of its productiveness might by some be questioned, and as I do not attribute it entirely to the Barilla, but partly to indefatigable and persevering manual exertion, directed by skill and judgment, I shall not name it, because on an extended scale, in the common routine of husbandry and under common management, it cannot be approached. If drilled in with the crop, two hundred weight of the Barilla will do; if sown broadcast, from two to five hundred weight will be required, according to the nature of the soil, and other circumstances, to be judged of by him who uses it.

On a large field of heavy clay, belonging to a neighbouring farmer, which had been summer fallowed for wheat, the gentleman proposed, as an experiment, that a part of it should be dressed with Barilla, in such

quantity that the acreable expense should be under that which the other portions cost him; one side of the field being heavily manured with soap ashes, and the other side with dung. This was acceded to, and sixteen hundred weight of Barilla was sown and harrowed in with the wheat, on about 3½ acres, in the middle of the field, on the 15th of November; but I must remark, that from what I saw, this is by no means a fair trial: for, besides the lateness of sowing, the wheat in the other parts of the field being at that time well out of the ground, the middle of the field is more wet and full of springs than any other part, so that in places there were sheets of ice some days ago, where the springs had bubbled up. If, under these disadvantages, it succeed, it will be irrefragable proof of its powers, and should it even fail, it will be no solid ground of condemnation; for, on such land, labour and expense will never make an adequate return, without that indispensible part of good husbandry—under draining. There is one very observable circumstance that shows it has been in operation through the winter, whether beneficially or not will hereafter appear; the colour of the ground is so changed as to point out, even at a distance, where the Barilla was sown.

The beneficial effects of soap ashes have beyond all doubt been experienced in many instances, and in others equally well authenticated, they have entirely failed. Some of these failures may have arisen from their application to a soil that did not want that peculiar quality that they impart, or by which they operate; other failures may have arisen from a deficiency of that quality in the ashes themselves: for, by an analysis of

different specimens of soap ashes, instituted by the gentleman I have spoken of, it was found that the best contained no more than ten pounds of alkali in a ton; and in some, where kelp had been used instead of Barilla, a ton of ashes contained no more than three pounds of alkali. It was this discovery that first induced him to try the pure Barilla, on the supposition that the alkali in the ashes was what imparted fertility. If this be so, two hundred weight of Barilla will benefit an acre of land as much as twenty tons of the best ashes. Impressed with this idea, he has collected clay, pond mud, scraping of roads, weeds, and every rubbish and refuse of the garden and fields, adding to every ton ten or twelve pounds of Barilla strewed over it; and, after lying a length of time, the whole has been turned: what its effect will be on the land has not been yet fully ascertained, but he is sanguine in the hope that it will be equal to a dressing of dung. The change produced on the whole mass is apparent; it has a whitish nitrous appearance, and is become mellow, and he thinks it will be peculiarly adapted for light soils and top dressings.

Applied in its pure state, it would seem best calculated for sour infertile clays, impregnated with metallic oxides; and from being so powerful an alkali, equally proper for peaty soils; in both cases laying hold of and neutralising the superabundant acid, sweetening the soil, and producing fertility; but its effects are yet too little known to hazard general conclusions, or to say for what soils it may be adapted, or how often, and at what intervals it may safely be applied.

On mixing Lime and Stable Manure.

[The following are the remarks alluded to in page 423 of the Memoirs. The circumstance of the stinted wheat appearing chiefly in manured fields, naturally excites wonder in those who think that nothing is wanting to secure a good crop, except abundance of stable dung: but from the observations of Mr. Somerville, it appears that a failure of wheat on manured spots takes place in England, similar to that observed in Maryland: the reason of which he ascribes to the insects bred in the fresh manure.]

For many years I have been struck with the failure of the wheat crop in the spring, more particularly at the circumstance of this failure happening oftenest upon the *richest and best prepared lands*, and after the most severe weather was over; and could never account for it upon any other principle than the looseness of the soil, occasioned by the manure put into it, and the operation of the winter frosts.

The observations which I have recently made, have however given me very different ideas; and though I am still of opinion that a number of the plants may, and in fact do perish, by being thrown out of the ground, I am at the same time convinced, that a very great majority of all the plants which die in the spring, are killed by vermin, and as I believe upon inquiry the assertion will be found true, that great numbers of vermin are generated in the manure, there must always be an evident risk of the crop being destroyed thereby.

The only probable remedy for such an evil seems to be, that of either preparing the manure in a particular manner, by mixing it with some substance or substances, whose deleterious effects will prove fatal to the insects; or by applying it in a form somewhat different from the mode commonly practiced.

Upon the first of these points I have to observe, that a cheap and valuable remedy may be had in most situations, which, when mixed with the dung, will not only destroy the vermin, but, by its operation upon the manure, render it much more valuable.—The article I allude to is *lime*, which, when mixed with well digested animal and vegetable manures, not only destroys every insect, or animalcule, which they contain, but by its solvent qualities accelerates putrefaction, and renders their effects upon the crop more certain and valuable, and accordingly many of the best farmers in England employ a mixture of lime in all their manure; but when to the advantage above mentioned, is superadded the destruction of such vermin as are likely to breed in the dung, and afterwards to destroy the crop, the mixture of lime with it will appear to be one of the most beneficial improvements in modern husbandry.*

When dung is intended for a compost, no attempt should be made to add any large quantity of lime or earth, till it is properly fermented; as every addition of that kind will be found to check fermentation, and diminish the value of the compound.—The lime and earth should be added, after the fermentation is finish-

* Inquiry into the cause of the blight and smut in wheat. Communications to Board of Agriculture, vol. 2, page 208.

ed, and the whole carefully mixed and laid up together. A few days after this is done, a second fermentation will come on, and, if the mixture has been properly turned over, and thoroughly incorporated, in a month or six weeks afterwards it will be fit for use.

Considerable judgment and attention will, however, be requisite, with regard to the quantity of lime, and other active principles employed; for if the quantity is small, their action upon the rich substances contained in the dung, will be partial and imperfect; and if too great, a considerable loss may be sustained by their over action. The proportion that will bring their active and passive qualities nearest to a balance, or, in plainer language, the quantity that will dissolve the enriching substances contained in the dung, will certainly be found the most useful.*

* "Outlines of the fifteenth chapter of the proposed general report from the Board of Agriculture;" on the subject of manures; by Robert Somerville. London. 1795.

On the impropriety of mixing lime with fresh dung, see Lord Dundonald's "Treatise on the intimate connexion that subsists between agriculture and chemistry." London. 1803.

Mangel Wurtzel. Winter Food for Cattle.

[The following account of methods used in the cultivation of the improved *beet-root*, or mangel wurtzel, is taken from a recent publication by Mr. *Pinder Simpson*, of the county of Essex, England, 1814.* Experiment must decide to what degree these statements will apply to the culture of this root in our country.

Fifty tons have been raised on an acre in England. The produce of one tenth of an acre will keep a bullock *fatting*, fourteen weeks. Dry fodder must accompany this green food. The produce of six acres will fatten sixty bullocks; allowing each 100 pounds per day; as appears in the statements made in this publication.

1. In broad cast, on strong land, spade trenched, ten inches deep, leaving the plants after hoeing nearly fifteen inches apart each way. Produce per acre 50 tons.

2. Transplanted in rows, three feet apart, the plants eighteen inches apart in each row. Produce per acre 22 tons.

3. Dibbling the seed, in rows two feet apart, and the plants left twelve inches apart in each row. Produce per acre 48 tons.

By these different methods, results will prove which is preferable. Its great advantages over turnips are

* The advertisement prefixed to the book states, that the observations were made upon crops of the root grown upon a farm at Bedfords, in the county of Essex, containing 600 acres, belonging to John Heaton Esq. and in his own occupation.

shown in every way, as well on account of the beet being more nutritious, as its not being subject to the fly, or other annoyances to turnip crops. Nor is the expense of cultivation so great.]

For the information and guidance of those occupiers of land, who may be desirous of cultivating the improved beet root upon strong land, the next chapter will contain a particular account of the method used in cultivating that root upon strong land at Bedfords. The method there stated, is that which has been found, on three years' trial, to be least expensive in the beginning, and most profitable in the end.—The cultivation of this root is earnestly recommended to the attention of all persons farming strong lands with a view to profit. It should never be forgotten, that 48 tons, the produce of only a single acre, of this root, will make ten bullocks fat enough for the butcher; and that six acres, of equal produce, will fatten sixty bullocks; that the profit on each bullock will be considerable; and that when the business of feeding is over, the yard will be full of rich dung: neither should it be forgotten, that the tenant who sells his straw, cannot partake of any of these advantages.

In proof of this assertion, the following facts are submitted for consideration:

Mr. Heaton bought two lean Welch bullocks, at Harlow Bush Fair, on the 9th of September. They cost together 34 pounds. They were pastured on the Rowens till the 20th of November following, when they were tied up, and fed with beet root and oat straw till the 9th of February following, when they were sold

together, in Romford market, for the sum of 50 pounds; yielding in twenty two weeks, a profit of 16 pounds, which is equal to 7s. 3d. per week, for each bullock.

These two bullocks were tied up twelve weeks each, in which time they ate eight tons, two hundred weight of beet root, the produce of only one sixth part of an acre of land, cultivated according to the method recommended in the following chapter.

The method used in the cultivation of the improved Beet Root, upon strong land, at Bedfords.

It may be proper, in the first place, to state what is meant by strong land. The surface soil is loamy, and from four to twelve inches deep, upon a bed of strong clay mixed with gravel. It is too heavy, and generally too wet, in the winter, even for sheep to eat a crop of turnips on the ground; and although good turnips are grown upon it, it is always necessary to draw them for the sheep, stall-fed cattle, or for cattle in the yards. The ground is prepared to receive the seed, and cleaned in the same way as it would have been for Swedish turnips. As that part of the business is so well known to all farmers, it is not necessary to enter into any detail upon it.

In the middle, or latter end of the month of April, the furrows are set out with the plough, two feet apart, and double ploughed; that is, the plough returns on the furrow to the point whence it set out, forming a ridge between each furrow.

Double ploughing with a common plough is preferred to single ploughing with a double mould board

plough, because it affords a greater depth of loose earth than the double mould board plough would produce.

In these furrows, the manure, which should be in a rotten state, is deposited, after the rate of six cubic yards to an acre.

The ridges are then split by the plough going and returning the same way as before mentioned, leaving the manure immediately under the middle of the new ridges. A light roller is then passed along the ridges, in the middle of which the seed is dibbled, so that the plants may receive all the benefit which can be derived from the manure.

The seed is deposited about an inch deep, whilst the moisture is fresh in the earth, and covered by drawing a garden rake along the rows.

After this, the light roller is again passed along the ridges, and the work is finished.

When the plants are about the size of a radish, they are hoed with a turnip hoe, leaving the plants in the rows about twelve inches apart. If any of the seeds fail, and there happen not to be an even crop, the roots, where they are too thick, are drawn out before the hoeing takes place, and transplanted, to fill up the vacant places, and insure a full crop, which is always certain, inasmuch as 99 plants out of 100, thrive and do well. In transplanting, care is necessary to prevent the point of the root from turning upwards.

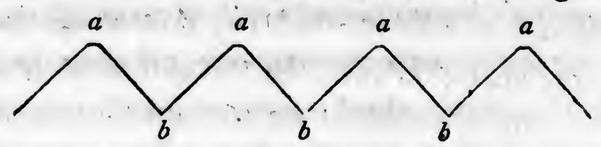
The weeds, whilst the plants are young, are kept hoed, but after the head of the plant has once spread, no weed can live underneath its shade, and the expense of hoeing afterwards is very trifling indeed.

The whole of the crop is taken up in the month of November, in dry weather. The tops are cut off *near* the *crown* of the plants, and the plants, when perfectly dry, are piled up in a shed, and covered with straw sufficiently thick to preserve them from the frost. They kept last year till the latter end of March, and they would have kept much longer.

The seed may be had of Cochran, seedsman, in Duke street, Grosvenor square, and of Messrs. Gibbs and Co. Half Moon street, Piccadilly. From three to four pounds of the seed will be sufficient for an acre of ground, prepared and dibbled according to the method here stated. The price last year was seven shillings per pound, but it may probably be less hereafter, as the growers of the root, so long as that high price continues, will of course save their own seed, and thereby lessen the demand from the seedsman.

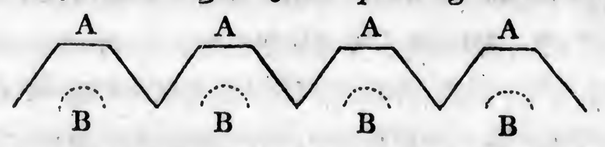
THE METHOD BEFORE DESCRIBED ELUCIDATED.

Form of the Ridges before manuring.



The tops of the ridges, about two inches broad, *a a a a.*
Intervals of twenty four inches from one *a* to another.
Depths about twelve inches from *a* to *b*.
Furrows where the manure is deposited, *b b b*.

Form of the Ridges after splitting and rolling.



Tops, A A A A, nine inches broad, in the middle of which the seed is deposited.
Situation of the manure, B B B B.

It will not be supposed, by any intelligent farmer, that where the quantity of the improved beet root given daily to a bullock is stated, it is meant that it should be given without dry food. It may, however, be necessary to say, that the same dry food must be given with the beet as is usually given with turnips. Mr. Heaton last year gave oat straw only, and the bullocks did well upon that food, and were sold to profit. No doubt they would have been ready for the butcher sooner, had good hay been given to them: but this fact may be relied upon, that fresh bullocks, fed upon the beet root and oat straw, will, in three months time, get fat enough for the butcher.

It may also be necessary to observe, that not a word, here stated, is intended to apply to such light turnip soils as will bear the trampling of sheep, without injury to the land. Mr. Heaton has none upon his farm, and I have not sufficient knowledge of the management of turnip land, of that description, to say, whether prudence would warrant any trial of the beet root upon a large scale, on such soil, to be eaten on the land.

Where a field, selected for a crop of beet, happens to be in a foul state, the seed had better be sown in a garden, and the whole field planted with the young beet, when of the size of a radish. This will give time for cleaning the ground, and fitting it for a crop; for, although the beets are destroyers of weeds, it is not meant to recommend sowing them on foul ground, or in any way to encourage a slovenly system of farming.

Although manure has been used in the cultivation of this root, it is not absolutely necessary; and, if not in a rotten state, it does mischief. Good crops have

been obtained at Bedfords *without manure*, and without injury to the succeeding crops of corn. Beet is fed from a depth considerably below the reach of the plough, as generally used; so that it does not draw the surface soil in which corn is fed.

The method of cultivating the beet root here recommended, is the same as that which is used in the cultivation of turnips, in Northumberland and other parts of the north, with this exception, that the rows there are 27 inches apart. There may be reasons in the north for still preferring that space, but in Essex the effect of it, in the cultivation of the beet root, would be, that, instead of 48 tons per acre, 43 tons only would be obtained. Experience has proved, that the roots do not get to a larger size in rows three feet apart, than they do in rows two feet apart. It may, therefore, fairly be presumed, that they would not be larger in rows 27 inches apart; and if not larger, the weight of the crop, per acre, must be less, because the plants decrease in number as the rows increase in space.

The advantages that would arise from the cultivation of these roots, upon a small part of every strong-land-farm throughout the kingdom, must be obvious. Calculations might be given that would astonish and almost exceed the belief of most readers. Such calculations, however, in general, are but little attended to, and it is thought better to omit them, hoping that enough has been said upon the subject, to fix the attention of every person interested in the cultivation of land.

Mode of analyzing and testing Gypsum; extracted from Professor Cooper's account of his experiments on sulphat of lime. Cooper's Emporium, New Series, vol. 1, page 325.

I procured 150 grains of gypsum from 100 of pure limestone, when the gypsum after being carefully washed in a moderate proportion of water, was dried for an hour on the top of a ten plate stove, on which I could just bear my hand. But when I calcined it for an hour in a full red heat, I procured from 100 grains of carbonat of lime, but 130 grains of gypsum.

I took a well characterized piece of compact gypsum from a ton that lay for sale in the street here; and reducing it to fine powder, I calcined it in a crucible in a *full* red heat for an hour. I drove off $21\frac{1}{2}$ parts: this occurred to me three times.

I took from a lump of the same gypsum (Nova Scotia, imported to Baltimore, and thence sent to Carlisle) some of the semi-transparent chrystals of a vein that ran through the lump. Exposed to heat in the same manner, the result was the same.

Hence I conclude; that 100 parts of pure carbonat of lime, will yield 130 parts of anhydrous gypsum (from which the water has been expelled) and from 151 to 152 parts of gypsum as it is commonly found.

The country adjoining the waters of the north east branch of Susquehanna, are now supplied with gypsum from the Genesee. This commerce began in 1811. A set of people in the neighbourhood of Pine creek,

in 1812, sold great quantities of common limestone for gypsum, and deceived many farmers, and injured many millstones by the deception. It may be worth while to give a few *characters of gypsum* that may prevent a similar imposition.

First. When a piece of stone is presented to you as gypsum, try to scratch it with your nail, and to chew it between your teeth. You may thus scratch and pulverize gypsum, but you cannot easily do so with limestone, which is much harder.

Secondly. Drop on it, a drop of spirit of salt, or of aqua fortis. If an effervescence, a bubbling, and extrication of air ensue, the stone is probably limestone; for no such effervescence takes place on a piece of gypsum, but the acid spreads evenly upon the surface, as a drop of water would do. Now and then indeed, a specimen of gypsum may contain a small portion of limestone, but this does not occur often.

Thirdly. If the preceding tests do not give satisfaction, then take 100 grains of the stone: reduce it to a fine powder: grind up with it 250 grains of common pearl ash, boil them in a tin or earthen vessel, with half a pint of water, to dryness. Wash what remains by three separate affusions of half a pint of boiling water: dry the sediment at the bottom. If the stone be gypsum, that sediment will weigh 77 or 78 grains; it will have all the properties of common limestone reduced to powder, it will effervesce with, and totally dissolve in a mixture of one part of spirit of salt to two parts of water, added by degrees till the whole be dissolved.

Professor Cooper's Analysis of various Specimens of Pennsylvania Limestone. Cooper's Emporium, New Series, vol. 1, *page* 318.

Some time ago the honourable *Richard Peters*, of Belmont, near Philadelphia, requested I would take the trouble of analyzing some limestones, for the purpose of ascertaining the quantity of magnesia they might contain. In England, the impression among scientific men, in consequence of the experiments of Mr. Tenant, in Phil. Trans. 1790, are, that limestone containing a considerable quantity of magnesia, such as the limestone of York, in Yorkshire; Bredon, in Leicestershire; Matlock, in Derbyshire, and some other places, were unfavourable to agriculture. Mr. Tenant found that seeds sown in earth, sprinkled with lime made from calcareous limestone, vegetated very well, and the lime operated favourably: but when sprinkled with an equal quantity of lime, made from a stone that contained two parts of magnesia to three of pure lime, they did not vegetate.

His experiments were made, evidently on *secondary* limestones containing magnesia; and the stratum of this kind of limestone he found superincumbent on the purer calcareous stone; and which in general he considers as alluvial limestone, in reference to the strata on which his experiments were made.

Judge Peters transmitted to me, nine different specimens of limestone from Chester county, [and Montgomery county] numbered and named as follows:

No. 1 Holstein's.	No. 6 Dr. Gardener's.
2 Coates's.	7 Barnet's.
3 Yocum's.	8 Bull's.
4 Cleaver's.	9 Baker's.
5 Hughes's.	

Of these, No. 7 is regarded as the strongest for building or for land, and No. 9 the weakest. The first four are strong lime, 5 and 6 of medium quality, and No. 8 nearly equal to No. 7: that is, according to their reputation in the neighbourhood.

Upon these limestones I have made experiments for the purpose of ascertaining their component parts, but chiefly as to the magnesian earth, they may hold.

It is not an easy problem to discover the most simple, the cheapest, and the most accurate method of separating magnesia from limestone and clay, (from lime and alumina.)

We have no good precipitant of magnesia: phosphoric acid requires combinations that make the results complicated, and drive us to calculation, which when I can, I would avoid.

The following methods have been used, to separate magnesia from a combined solution of lime and magnesia in the muriatic acid.

1st. Separate the lime by the oxalic acid. This is too expensive.

2ly. Precipitate the lime by saturated carbonat of potash, which in the cold throws down the carbonat of lime, and the residual liquor heated lets fall the carbonat of magnesia. This is a method recommended by Davy and Henry; but I have never been able by

this method perfectly to keep separate the carbonats of these two earths.

3ly. Throw down the carbonat of lime by carbonat of ammonia: filter: then add to the muriat of magnesia containing carbonat of ammonia, phosphat of soda. The ammoniaco-phosphat of magnesia is precipitated; and 151 grains of this triple salt dried at 90° of Fahrenheit, answers to 100 grains of muriat of magnesia. Hence, if 20 grains of a mixed solution of the muriats of lime and magnesia give 15,1 grains of ammoniaco-phosphat of magnesia, the mixture contains equal quantities of muriat of lime and magnesia. Or, 100 grains so dried are equal to 111 grains chrystallized, or 62,2 of dried sulphat of magnesia. But this seems to me below the average water of chrystallization in sulphat of magnesia, which contains nearly 50 per cent. 26 Nich. Journ. 277.

This process, is used by Dr. Henry, Dr. Wollaston, and I believe by Dr. Marcet.

4ly. The lime may be precipitated by oxalat of potash, and the muriat of magnesia, may be separated either by the filter or by alcohol: and precipitated either by hot carbonat of potash, or by ammoniaco-phosphat of soda. Or the alcohol or the acid may be driven off by exposure for an hour to red heat. Or, by sulphuric acid, the magnesia may be chrystallized under gentle evaporation into Epsom, or the bitter purging salt of magnesia.

5ly. The muriat of lime, may be precipitated into Gypsum, either by sulphuric acid, or by Glauber's or Epsom salt, acidulated with a few drops of oil of vitriol.

6ly. The limestone containing magnesia, may be reduced into an impalpable powder, and treated with an equal weight of oil of vitriol, mixed with thrice its quantity of water. When the limestone is well powdered and sifted through fine muslin, and the superfluous acid driven off by heat, I believe this is as good a method as any.

In making the experiments of which I am about to give the result, I proceeded in two ways.

First. I took 100 grains of the stone powdered and sifted, and treated it with muriatic acid diluted with three waters by measure, stirring it frequently: after four hours, the supernatant liquor was poured off, and the undissolved residuum washed with an equal quantity of hot water as of the acid liquor, filtered, and dried in the heat of about 160 Fah. and then weighed.

The solution, was then precipitated by a sufficient quantity of oil of vitriol cautiously added: it was left to stand after stirring till the gypsum had formed. Then filtered, and the separated gypsum put aside.

This second filtered solution, contained, muriat of magnesia, a small quantity of sulphat of magnesia, a small quantity of sulphat of lime, and alumina, with excess of acid. The alumina was thrown down in a dirty-coloured floculent precipitate, by the cautious addition of carbonat of ammonia, and was separated by the filter and washed, dried and weighed. The solution was then precipitated by hot carbonat of potash which threw down the magnesia and the lime; and filtered. This precipitate was re-dissolved in sulphuric acid, and left to stand. The sulphat of lime (general-

ly about one sixth) separated spontaneously, fell down and was added to the first portion.

The whole of the magnesia was then thrown down by carbonat of potash, well washed, dried over a charcoal fire in the heat of about 160° and then weighed.

The sulphat of lime, or gypsum, was exposed in a crucible for two hours to a red heat, and the lime calculated on the proportion of 100 parts limestone to 130 of the anhydrous gypsum. A proportion, for which I will assign my reasons in a supplement to the present paper.

Secondly. I proceeded in another way.

I treated the finely powdered limestone with strong sulphuric acid (oil of vitriol of commerce;) triturating them together in a glass mortar. I then added four times the quantity of water. The clear liquor was decanted from the sediment which was washed with another portion of water, and the liquors added together. The sediment (gypsum) was rendered anhydrous by exposure to a red heat in a crucible for two hours, and the limestone calculated on the proportion of 10 parts limestone to 13 of anhydrous gyps: deducting the silex previously found. The filtered solution to which the washings were added, was concentrated by evaporation, which occasioned a slight precipitate (about $\frac{1}{6}$th) of sulphat of lime: it was then treated with carbonat of ammonia for the alumina, and with carbonat of potash for the magnesia as before.

The component parts of the stones sent to me, were ascertained on the average of these two methods.

The limestones transmitted to me, bore evident marks of contiguity to primitive strata. The colouring matter was black hornblende, sometimes in streaks or veins, sometimes minutely divided and mixed with the limestone, giving the greyish tinge to the stone. The 9th specimen was intermixed with mica; the insoluble residuum of the four first specimens in dilute marine acid contained a small portion of matter, silky to the touch. I believe all the limestones connected with the range of primitive formations on the seaboard of our country from Boston to Virginia contain more or less of magnesia. They are in the immediate neighbourhood of the steatite and other magnesian strata, that envelope as a matrix, the chromat of iron. I tried the specific gravity of three of them, which varied from 2,65 to 2,72 the usual range of common limestones.

No. 1. *Holstein's:* Colour, greyish white: Fracture, uneven: Surface, common splintery: the stone seems to consist of minute lustrous chrystals: slightly fetid on being pounded. I obtained in 100 parts, silex 3, alumina 2, carbonat of magnesia 12. The rest was carbonat of lime or pure limestone. The traces of iron were evident with tincture of galls and prussiat of potash, but in no greater degree than might be attributed to the usual impurity of the acids of commerce. My muriatic acid was freed from the sulphuric, by muriat of Baryt.

No. 2. *Coates's.* Colour, greyish white: Fracture, uneven: Surface, fine splintery, consisting of minute sparkling chrystals. I obtained in 100 parts, of silex 3, alumina 2, carbonat of magnesia 14. The rest was pure limestone.

No. 3. *Yocum's.* Colour, greyish white streaked with blueish grey, being coloured with hornblende (amphi-

bole.) Fracture uneven: Surface, splintery, small sparkling chrystals. I obtained in 100 parts, silex 4, alumina 2, carbonat of magnesia 14. The rest was pure limestone.

No. 4. *Cleaver's.* Colour, blueish grey: Fracture uneven in one direction, but splitting into lamina of about half an inch thick in the other; there was a very thin clay coloured sediment between the lamina: Surface, opake, without lustre. I obtained from 100 parts, silex 4, alumina 6, carbonat of magnesia 14. The rest was pure limestone.

No. 5. *Hughes's.* Colour, white inclining to grey: Fracture uneven: Surface, splintery, opake, void of lustre. I obtained from 100 parts, silex 5, alumina 2, carbonat of magnesia 12. The rest, pure limestone.

No. 6. *Dr. Gardener's.* Colour, greyish inclining to blueish white. Fracture uneven: Texture, a very fine, easily-pounded, sandy grit, consisting of minute lustry chrystals. I obtained from 100 parts, silex 2, alumina 0, carbonat of magnesia 16. The rest, pure limestone.

No. 7. *Barnet's.* Colour, white with a very slight clay coloured tinge: Fracture uneven: Surface, chrystallized lustry facets: Texture, saccharoid, the same as the saccharoid limestone on the York turnpike road about 10 miles from Baltimore. I obtained, silex 1, alumina 0, carbonat of magnesia 14. The rest, pure limestone.

No. 8. *Bull's.* Appearance like No. 7, only the facets of the chrystals much smaller. Silex 1, alumina 0, carbonat of magnesia 14, the rest limestone.

No. 9. *Baker's.* Colour, ash-grey intermixed with brown mica, so as to bear the appearance of a mixture

of pepper and salt: Small lustry chrystals. I obtained silex 36, undecomposed mica 4, alumina by precipitation 6, carbonat of magnesia 4. The rest limestone.

Hence it would seem, that the proportion of magnesia in these stones, is not so great as to produce any remarkable effect, either in agriculture, or as cements. The last (No. 9,) is doubtless the worst, as containing so large a proportion of siliceous sand, which on light soils is worse than useless.

Tenant's limestones, contained a much larger portion of magnesia, and the effect was therefore more evident. The greater proportion of limestone used in England than in this country, with the same effect, may arise not from the nature of the lime, but of the soil whereon it is put. It is there used in large proportion to strong loamy arable soils, and to swampy, spouty ground, that tends to produce sorrel. When it is used for the purpose of producing white clover, for which it seems to be a specific stimulus, it is not applied in greater proportion there than here, and merely as a top dressing. That is, so far as my observation and recollection enable me to speak on the subject.*

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* In Evans and Ruffy's FARMER'S JOURNAL, August 30th, 1813, there is a paper, in which it is averred, that MAGNESIAN LIME, *in proper quantities*, is much used in several parts of *England*. The writer cites highly respectable authorities, (among them *Sir H. Davy*,) to prove the salutary efficiency of such lime; in quantities not exceeding one fourth of the dressing with other lime. It is thercin said, that no limestone in *England* contains more than 22 per cent. of *magnesia*, and the most usual proportion is about one fifth. R. P.

Observations on the culture of Summer Wheat, or Spring Wheat, from a Pamphlet by C. T. Skurray, Esquire, of Devonshire. London, 1813.

According to Mr. Skurray, the real summer wheat is a native of the south of Europe, where it is called *Blé Tremois*, and is so tender in the early stages of its growth, that a severe frost would destroy it: the middle of April, therefore [in England] is the proper time to begin sowing it, and from that until the beginning of May. It ripens as early as the common wheat; and in fact rarely exceeds four months between the sowing and reaping. It is not liable to rust or mildew, even in those situations where other wheat is often destroyed by it. The soil best adapted for it is a good loam; but any soil that is in good heart, if not too light, will produce a crop.

The quantity of seed required is about three bushels per acre, prepared with lime and brine, as customary; it should be well rolled after sowing, and again when three inches above ground, and of course, weeded in due season, if requisite.

As it is the peculiar nature of this wheat to appear ripe, by the colour of the straw, long before the grain has arrived at maturity, great care should be taken to examine the ears, before the harvest people are ordered into the field, otherwise a serious loss may be sustained. It is a small grain, but very heavy, and the husk or skin is thinner than most spring wheat; consequently it produces more flower. It is sometimes bearded, but this distinction varies with the soil. The

straw is slender and short, the ears small, but generally so well filled, that the chests open and expose the grain before it is ripe. The stem of the straw is always a little bent at the joints, which is not the case in any other wheat.

There are numerous varieties of spring wheat, according to Mr. Skurray, and one sometimes answers while another will not. Seed of the genuine sort may be had of Messrs. Cook, Fisher and Co. opposite the Pantheon, Oxford street, London.

On the Cultivation of Carrots.

[The providing an abundance of succulent food for sheep, and other farm stock, when they have young, is all essential to their health and prosperity. For this reason, the attention of farmers is called to the cultivation of the *carrot*, of the utility of which root the most abundant testimony is afforded by various British farmers; and some in the United States, whose experiments have been communicated to the Agricultural Society. With a good stock of carrots and mangel wurtzel, a farmer need not dread a long or severe winter, or be apprehensive about the health of his breeding stock.

The attention of the sheep farmers in Albany and Saratoga counties, New York, is particularly called to the growth of carrots. The nature of much of their soil is particularly adapted for them, and they have hills of leached ashes for manure, of which, (in 1812,) no use was made!!

The body of the following paper is chiefly abridged from Dickson's Agriculture, London, 1805.]

The orange carrot, the root of which is larger, the colour darker, and the flesh more juicy and saccharine, than in the other varieties, is the most proper sort for field culture. Deep friable, loamy, or sandy

soils, are the best, but most soils will answer, except those of a stiff clay, and thin gravel. Two or three deep ploughings, (say 14 inches,) are essential, to enable the roots to push downward.—Two should be given in the autumn, or early in the winter, and one in the spring. At the last ploughing, in March, the farm yard manure should be turned in, and the surface of the ground immediately well harrowed.*

The cultivator should save his own carrot seed, by selecting annually some of the most perfect and best shaped roots of the preceding year's growth; to be set out separately for the purpose, early in the spring. Saw dust, bran, ashes, or dry sand, are to be mixed with them [and well rubbed together] that they may be separated and sown more regularly.

J. C. Curwen, M. P. of Cumberland, England, sowed carrot seed, previously mixed with wet sand, and placed in a warm situation, on high ridges, three feet asunder. By this method the seed is in a state of vegetation before it is sown; so that a fortnight is gained by it, and the carrots are less liable to be injured by weeds.†

From four to six pounds broadcast are necessary. The seed should be sown as early as the frost will permit, and covered with a light harrow. As carrots are of a delicate nature while young, and do not rise quick-

* Mr. Cooper, of New Jersey, recommends ashes as a manure, and to choose ground that has been in potatoes the preceding year. J. M.

† Transactions Society of Arts, London, vol. 24.

ly,* they must be kept free from the shade of weeds, by small hand hoes, or by hand weeding. This operation may be rendered less difficult by having the crops sown on ridges of such breadth as may be easily managed by two or three persons. A second hoeing should be given in three weeks from the first; and the plants set out to their proper distances, which varies from nine to eighteen inches each way; experience proving that the crops are finer and the roots larger, than when the plants stand nearer to each other. A third hoeing will be requisite, when the weeds must be completely cut out, and the weak plants and double ones removed; further hoeings may be necessary, of which the cultivator must be the judge; the object being to keep the land well stirred and the crop clean.

Harvesting.—Mr. Mason recommends the use of a narrow spade, which the labourer strikes with one hand into the ground, pressing it sideways at the same time, while he draws the root with the other hand. After being raised from the ground, the roots should remain in the field for two or three days to dry,† then packed in heaps, with dry straw, or dry sand, in some dry building.—When piled in the field, a ditch should be made round the heaps, to carry off the water.‡ Mr.

* Six weeks will sometimes elapse between the sowing of the seed and the appearance of the parsley leaf. Mr. Mason, Transactions Society of Arts, London, vol. 23.

† The drying of the plants would be expedited by cutting off the tops, when first taken out of the ground. They may be given to cattle. J. M.

‡ Rev. Mr. Eldridge. Com. to Board of Agriculture, vol. 5.

Curwen directs a small piece to be cut out from the top of each root, to prevent it from vegetating.*

All farm stock relish carrots and are improved in health by them. For sheep or cows, while suckling, they are invaluable.

The Rev. Mr. Eldridge says he mowed carrot tops for his cow, twice in a season, without injury to the root, and afforded an opportunity of cleaning them better than could be done when they had their tops on. They greatly enrich and sweeten milk.† Mr. Curwen, from one acre and a rood, in 1804, had 4143 stone, (of 14 pounds.)

Mr. Mason had eighteen loads, of forty heaped bushels to the load, per acre.‡

Mr. Cooper, of New Jersey, states, that he has had at the rate of 800 bushels of carrots to the acre.

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* Transactions Society of Arts, vol. 24.

† Com. to Board of Agriculture, London, vol. 5, page 211.

‡ Transactions Society of Arts, vol. 23.

[From the Wilkesbarre Gleaner of April, 1814.]

Owego Village.—Plaster and Salt.

A friend of ours has lately returned from Owego, and has been polite enough to favour us with a schedule obtained from a respectable merchant of the village, of the business transacted there during the last winter. The curious cannot fail to be pleased with the perusal. It should be borne in mind, that it is but a few years since the place where Owego is built was a wilderness.

During the sleighing (last winter, 1813-14) there were on the road from Ithaca, the head of the Cayuga lake, to Owego, from 500 to 700 sleighs: there are now at Owego (March 10th) about 9500 tons of plaster; and 2500 barrels of salt:—to transport these to market will require 200 arks, which will cost about 100 dollars each. Plaster, the arks given in, is about 20 dollars per ton at Owego; and the salt itself will bring 6 dollars per barrel, making in the whole,

9500 tons of plaster, at 20 dollars,	$ 190,000
2500 barrels of salt, at 6 dollars,	15,000
9 arks, to carry salt, at 100 dollars,	900
	$ 205,900

The oats consumed daily, allowing one bushel to each team, (many of them had from four to six horses,) would be 700 bushels.

Cost of plaster at the bed, three to four dollars per ton.—Transportation to Owego, seven to eight dollars per ton.

From the Minute Book of the Agricultural Society.

On the Duration of Posts, when their natural Position is reversed.—Extract of a Letter from Mr. John R. Evans, to the Secretary of the Philadelphia Society for promoting Agriculture, dated Nov. 29, 1811.

On removing the old fence of my garden, to set a new one, about five years since, I found that the old fence was supported by a few posts, that were forked, and the fork down, and that they were quite sound, while the rest were rotten, and broken off at the ground; the yard fence, (only five pannel,) three parts of which were strong and sound, and likely to last for ten years more, were not forked, but from their being knotty, it was easy to see that they were top in the ground. I have made enquiry of the carpenter who built the fence, (who is yet living,) and he says the fence stood 20 or 21 years, and that it was the design of my predecessor to turn all posts top down, that would admit of it, the fact being known to him that they would last longer.*

JOHN R. EVANS.

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* I have experienced the truth of the fact above stated. I do not pretend accurately and satisfactorily to account for it. I have *conjectured*, that by reversing the vessels in which the sap had been accustomed to circulate, whilst the tree was in life, the moisture drawn up by the sun, in vessels even of dead timber, was impeded by the reversed position. Had the posts been, as they generally are, placed with their butt ends downward, the vessels designed for circulation of sap, might be filled with moisture from the air or earth. However fanciful this conjecture may appear, the fact mentioned by Mr. Evans, is important, and proved in many instances.

R. PETERS.

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ERRATA.

Page vii,	line 27,	for *canemus*,	read *canimus*.
xvii,	11,	omit *Benjamin B. Howell.*	
lxxvi,	1,	omit *steady.*	
ib.	7,	for *steady*,	read *zealous.*
Memoirs,	19,	13, for *African*,	read *Asiatic.*
	41,	23, for *this*,	read *last.*
	44,	23, for *pumice*,	read *pomace, passim.*
	65,	25, for *quick*,	read *quitch.*
	71,	28, for *stooks*,	read *tramp-cocks.*
	76,	15, for *sheets*,	read *pages.*
	134,	28, for *product*,	read *products.*
	143,	10, for *Castaniæ*,	read *Castaneæ.*
	168,	24, for *drawn*,	read *spread.*
	210,	24, for *we know, &c.*	read *We know, &c.*
	229,	9, for *dot*,	read *not.*
	238,	5, after *plaster be*,	insert *such an.*
	239,	9, for *parts*,	read *part.*
	271,	19, *laissez les faire*,	original expression.
	281,	20, before *brown*,	insert *redish.*
	339,	26, for *seventeen*,	read *eighteen.*—No chronological accuracy was intended. But the observation seems to refer to the *Georgics of Virgil*, which are believed to have been written shortly before the Christian æra.
	341,	9, after *they are*,	insert *seen.*
	342,	8, for *funnel*,	read *tunnel.*
	351,	3, for *species of fish*,	read *species of river fish.*
	370,	3, for *indispensibly*,	read *indispensably.*
	378,	24, for *inferior*,	read *superior.*
	389,	14, for *them*,	read *him.*
	389,	22, for *person*,	read *persons.*
Appendix,	94,	10, for *reason*,	read *cause.*

Grammatical errors, not noticed, and those in punctuation, are left for correction to candid readers.

NOTICES.

A communication on the subject of TURNIPS, was neglected to be brought forward, by the writer, in time for publication in its proper place.

He had been long in the practice of sowing *radish* seed, (in a proportion of about one eighth,) with that of the *turnip*, to guard the latter against the ravages of the fly. The radish shoots earlier, its top outgrows that of the turnip; and, by affording a more agreeable and plentiful repast to the fly, protects the young turnips from injury. This circumstance has been long known in *America*. The writer's attention was attracted to it, by his seeing, in a late English print, an account of a handsome reward having been recently bestowed on one who *claimed*, in *England*, to be the discoverer of this salutary practice.

The radishes may be drawn for feeding, or destroyed by the hoe, when the turnip is out of danger.

R. P.

SCAVENGER EELS.

JAMES HAMILTON, ESQ. at his seat—the *Woodlands*, is completing a plan, begun by the late *William Hamilton, Esq.* for conducting the water of a spring, or springs, from a considerable distance, into his garden. A number of the pipes, (wooden,) had been laid and covered some years; and had been so neglected, that they became choaked with mud, and other pervious obstructions. An ingenious person, *(Miller,)* one of the workmen, suggested an expedient, which was found perfectly successful in clearing the pipes. He made use of EELS; which soon worked their way through the mud and silt; and, with the assistance of the water constantly flowing into the tubes, freed the pipes from every obstruction. As such impediments may exist in other pipes, now commonly used for the conveyance of water subterraneously, it is deemed useful to mention the circumstance, for general information.

There were two ranges of pipes; each from a spring distant from the other; but finally united in one conductor. The diameter of the tubes, two inches. The wood, white cedar—generally layed several feet under ground; each log from eight to ten feet long, and joined in the usual manner. The length of one arm, 100 yards—that of the other, 130. In the longest three eels were inserted;—in the shorter, two. They were selected for strength, more than size. The eels were turned in at the ends next the springs; that the water might assist them, in their exertions to reach the opposite ends. Plates of perforated metal, secured against the escape of the eels, at the spring-heads; and yet admitted the water. They worked through the tubes

in three days, in the whole; but the shortest arm was cleared the soonest, by twelve or fourteen hours. Two of the eels came out dead;—but those living were, evidently, slimy and debilitated by their laborious passage. *Miller*, (who gave this information,) said, that if the dead eels had, at first, remained in the tube, he should not have been uneasy.—The living eels had worked a sufficient passage for the water; which ultimately would have brought away the putrefied remains of those dead. Sandy sediment, with shavings or borings, and viscous vegetable matter, issued, plenteously, from the pipes.

Syringes (as they are called,)—that is—poles, like sponges for cannon, with wool, tow, or straw, lashed or otherwise attached to one end, are often used to assist in clearing such conducting pipes. By pumping, or working the syringes, they agitate and operate on the water and air in the tubes; and thus the foreign matter is expelled or floated out.

R. P.

August 5th, 1814.

It is said, that in *Ireland*, (and probably in other parts of *Europe*,) it is not uncommon to turn Eels into French, or other covered hollow drains; for the purpose of clearing the passages for the water, when, in boggy or wet grounds, they are obstructed by mud or silt.

R. Peters.

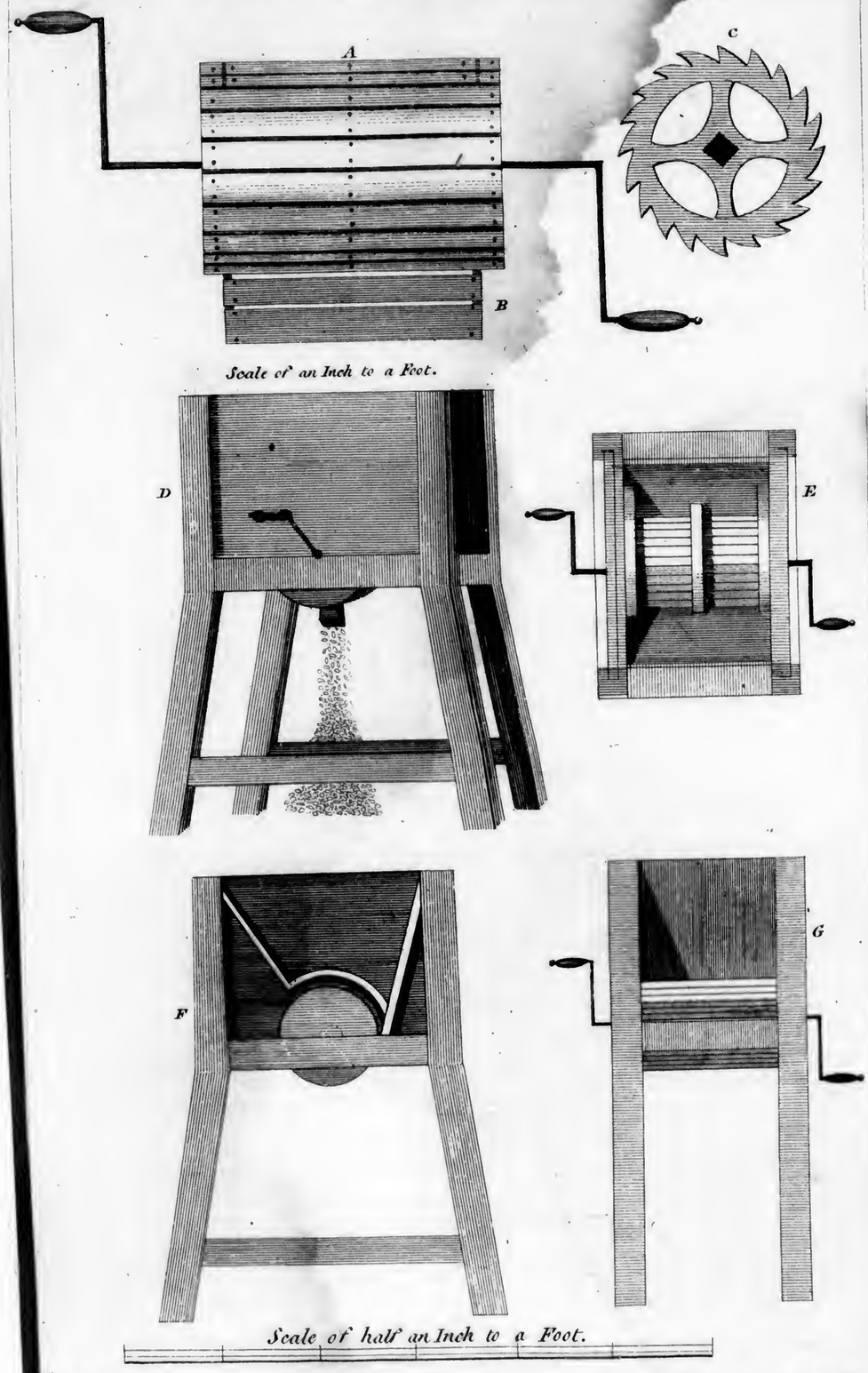
DESCRIPTION OF THE POTATOE OR TURNIP SLICER.

This useful agricultural implement was invented in France, and is described in an excellent work on sheep, by Mr. Tessier, (*Instructions sur les Bêtes a Laine, Paris*, 1810,) a faithful translation of which has been made in New York, and is also for sale by Kimber and Conrad, Philadelphia. In that work, which no sheep farmer should be without, a cut, differing from the plate here annexed, and a full description of the parts, are given, from which, and the two draughts, there will be no difficulty in the construction of a slicer. —A wooden cylinder, having ten iron blades, nearly its whole length, is so fixed, that the edge of one projects over the back of the one before it.—The knives are each 1 1-4 inches wide, and set at the height of one line, (12th of an inch,) one from the other: as the cylinder revolves, two of the knives open, and permit the sliced roots to fall out; and in its progress they close again.

☞ The Society resolved, at their annual meeting in January last, to continue the premiums heretofore offered.

THE END.

POTATOE or TURNIP SLICER.



J. Barralet del. 1810. Memoirs of Philad.a Ag: Society, Vol. 3. J.H. Seymour sc.

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